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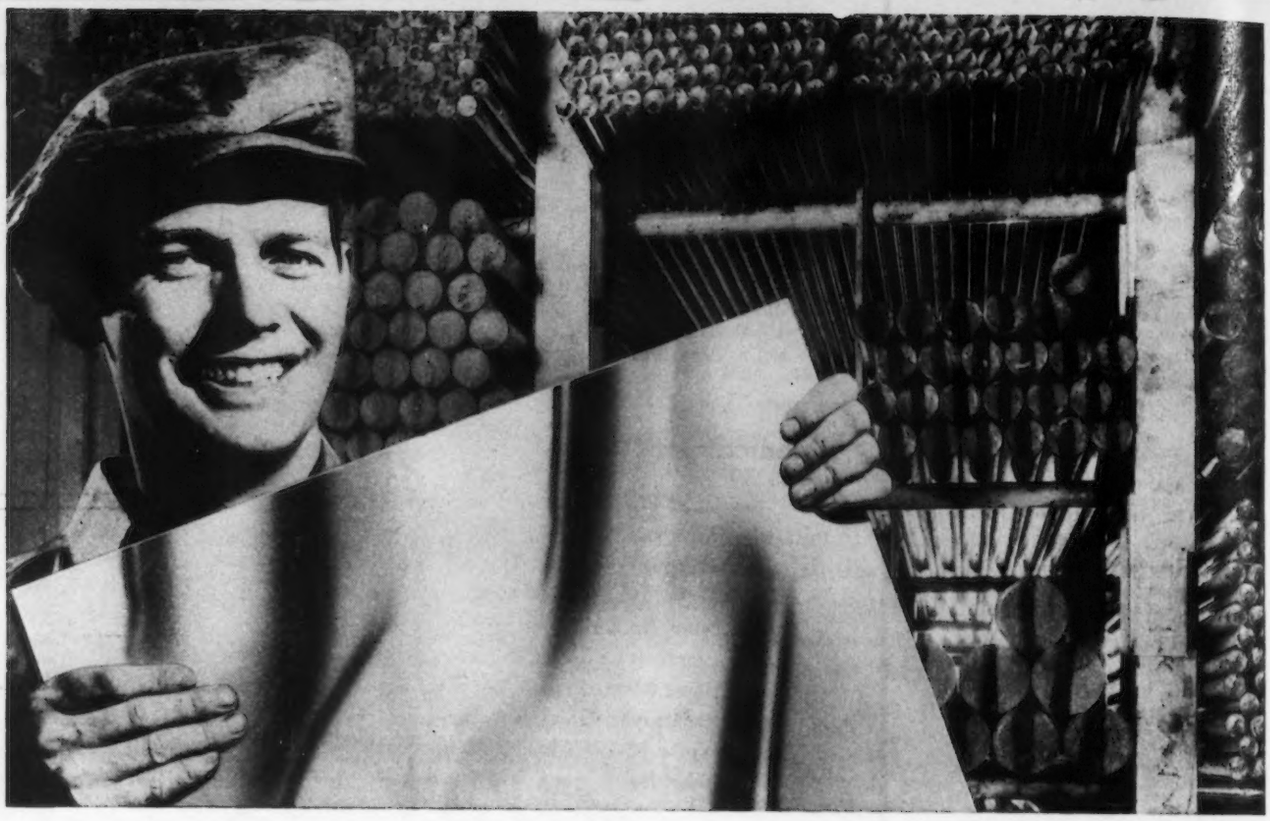

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Notice to Aggressors

THE signing of the Atlantic Pact by the nations of the West marks a milestone in the diplomatic history of the U. S. It places a period upon any lingering isolationism that may have been left from the era preceding the First World War. It means that our security must be organized; that allies must be cultivated; that military arrangements must be concerted before the first shot is fired.

With two exceptions, the Monroe Doctrine and the Open Door in China, our foreign policy has always been amorphous and extemporaneous. It was improvised from occasion to occasion and the theme was played strictly by ear.

The Atlantic Pact recognizes danger and takes intelligent forehanded action to meet it. There is no doubt about the object of its provisions. By unmistakable deed and repeated word Russia has stated her purpose. The vast literature of communism openly advocates the violent destruction of its foes. The war which it outlines is a war without quarter. The only peace which it proposes is the peace of complete submission. The West has been slow to learn but the Atlantic Pact shows that finally—albeit reluctantly—the lesson has been learned.

Since the Pact frankly leans upon the naked sword it comes as a blow to many sincere people who have sought for some other formula than force to protect our interests and assure peace. It postpones the possibility of world government. It greatly limits the role of the United Nations. The Pact, in spite of official assurance to the contrary, calls for a careful reexamination of the purpose and possible usefulness of the U. N.

Launched with high hopes, this organization has served primarily as a sounding board for the philippics of Molotov, Vishinsky and Manuilsky. U. N. has been a haven for the pinks whom tardy security measures have driven out of our own government. It has proved itself impotent in the solution of even minor squabbles such as the "revolt" in Greece, the civil war in Indonesia and the bloody disorders in India. The impending entry of China into the Soviet orbit would place another Red representative on the Security Council to deprive that body of any remaining vitality.

The Atlantic Pact, therefore, is a healthy manifestation of realism —a salutary gain in American diplomatic maturity. Although it may cause many of our idealists to wince, the Pact, supported by the full weight of history, proves that national safety cannot be entrusted to covenants—least of all to universal pacts of peace or world leagues of super-government. The predator, whether a lion in the jungle or a military power in the society of nations, always moves against weakness. He is never deterred by justice, morals or contract. The lion, whose courage is proverbial, never attacks the bull gorilla, the full grown buffalo or the elephant. He picks easier prey.

Hitler launched his attack against Poland because he thought it was an easy touch, in which he was right. He moved against Russia because faulty intelligence told him that she would succumb in sixty days. Nothing is more likely to discourage an aggressor than the possession of dangerous power by the potential victim and the latter's determination to use it. Therein lies the great virtue of the Pact.

Joseph Stagg Lawrence

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METALLURGY SALES OPERATIONS

► Conversion steel in the form of semifinished is piling high in the yards of some Midwest converting mills. One large converter has approximately 120,000 net tons of such stocks on hand. Another smaller mill has considerable inventory. In both cases consumers are expected to take the sheets and strip from these ingots and slabs.

But if consumers decide to cancel, some mills will find themselves with heavy inventories of semifinished steel which they have already bought and paid for. This inventory is not high priced, but it's a lot of cold steel to have sitting around should the steel market fare worse than expected.

► Weirton Steel plans to build the world's largest openhearth furnace at Weirton this year. Some 550 tons will be tapped per heat, using two 275-ton ladles.

► Two large American oil companies have cancelled sizable orders for oil well pipe and casing from an European firm. The supplies were to have been delivered to the Middle East. To keep the pipe maker from feeling too bad, the companies showed him orders which had been cancelled in this country too.

► Employing the Jominy end-quench hardenability test in reverse makes possible the study of certain characteristics of quenching media. One such investigation recently showed that contaminants which form an emulsion with quenching oil seriously impair quenching efficiency, while contaminants forming a true solution with quenching oils may increase quenching power.

► A U. S. machine tool builder has permission from the British Board of Trade to build a plant in Great Britain. A British machine tool builder has been trying to set up a manufacturing agreement with a U. S. machine tool builder or major machine tool dealer to manufacture and sell the machine in this country.

► Some companies which have been straining for all out production will achieve substantial cost savings as they cutback on output schedules. Here are some possible savings: (1) less overtime pay, (2) less marginal plant and equipment used, (3) no more procurement through gray market and conversion at bloated prices and (4) elimination of production bottlenecks. Such savings could permit lower consumer prices in the competitive buyers market.

Of course if production schedules are cut back too far the ever-present overhead charges will cause unit cost to rise.

► Use of tungsten-molybdenum thermocouples, properly annealed and calibrated, in the study of high temperature alloys has effectively increased accuracy of temperature measurements above 3000°F. Service up to 3990°F is satisfactory with this thermocouple pair.

► Inland Steel Co.'s eighth blast furnace may not be blown in this year. This furnace is relined ready to go but the seven furnaces now running are producing more than enough basic iron for steelmaking. One of these seven blast furnaces may be changed to malleable within the next month or so.

► Fisher Body Div. of General Motors Corp. established a unique record in making the recent model changeover. Six of Fisher's fabricating plants made the change without closing for even a single day. Two assembly plants made the switch with no interruption in production. Average shutdown period for all assembly plants was 7 days. The usual shutdown in the prewar era was 2 to 6 weeks.

► Titanium is active chemically and at high temperatures reacts readily with the atmosphere. This characteristic makes it extremely difficult to produce a pure metal by melting and casting as with other metals. However, the Bureau of Mines has developed a process in which titanium powder can be heated to elevated temperatures while sealed in ductile, gastight containers. Hot-rolling the complete assembly produces a solid, nonporous metal for working into construction members, machinery parts and many other materials.

► A $15 million steel plant expansion is tentatively scheduled for construction in the Cleveland area this year.

► When the steel market was on its way up in tonnage and price a work stoppage only aggravated the situation. If another stoppage is coming now it may not have the same effect as it did when things were tight. It may, when the trend is down, aggravate the downward trend. That is why some steel people are not too concerned about what the coal strike and steel negotiations may do to steel output. Especially when a lot of them expect to be looking for orders later this year.

Cold Forming Stainless Steels

An analysis of cold forming techniques suitable for various grades of stainless by such processes as stamping, drawing, bending, blanking, punching, bulging, etc., is discussed in the first half of this two-part article. The second part deals with further modifications of drawing methods, annealing, pickling, tool materials, lubricants and other factors pertinent to the cold forming of stainless steels.

By LESTER F. SPENCER
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PRESS operations, blanking, punching, perforating, bending, and stamping, can be performed on all stainless steels. The martensitic grades, especially where the carbon content is rather high, must be in the annealed state before forming, but in low carbon martensitic grades, such as type 410, limited fabrication may be undertaken when the material is in the hardened state. Both ferritic and the austenitic alloys, in addition to the usual press operations, can be deep drawn and spun into rather complicated shapes, the austenitic alloys being the more formable of the two. The comparative elongation, shown in table I, indicates the relative ductility of both the ferritic and austenitic steels in comparison with deep drawing low carbon sheet. The austenitic types are superior in this respect to mild steel and ferritic stainless; whereas the ferritic grades are less ductile than deep drawing mild steel sheet. The cold working properties of the austenitic steels are shown in table II, resulting in hardness values that make this material valuable for spring applications. However, the cold work hardness imposed upon austenitic steels reduces formability to simple press operations.

A comparative test for ductility and extent of drawing properties is the Olsen Cup test, with fig. 1 illustrating this comparison. The test was performed on 0.035 in. stock, stainless types 430 and 302 and low carbon deep drawing steel. Readings obtained were as follows:

	Test No. 1	Test No. 2
Stainless type 430	0.0330 in.	0.327 in.
Stainless type 302	0.432 in.	0.440 in.
Low carbon deep drawing	0.360 in.	0.370 in.

From the test results, stainless 302 has the best values and stainless 430 has lower values than low carbon deep drawing grade.

The designation of proper finish for a specific application is important. Finishes are shown in table III. The hot rolled, annealed and pickled finish is necessary for successful deep drawing of the austenitic steels. For limited formability and where no annealing is required

TABLE I

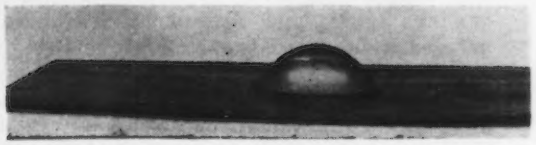
Percentage of Elongation of Deep Drawing Mild Steel and Various Stainless Steels[1]

Steel	Elongation in 2 in., Pct	Grain Structure
Mild Steel	35 to 40	Pearlitic
410	28 to 32	Martensitic-Ferritic
430	25 to 30	Ferritic
446	20 to 25	Ferritic
301	55 to 60	Austenitic
304	60 to 65	Austenitic
302	55 to 60	Austenitic
309	45 to 50	Austenitic

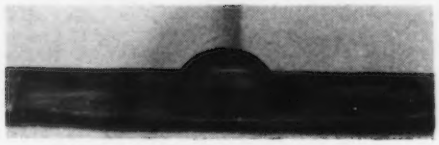
TABLE II

Hardness Ranges of Various Tempers of the Stainless Steels[1]

Temper Designation	Approximate Hardness, Rockwell		
	Type 301	Type 302	Type 430
Dead Soft	B75 to B80	B75 to B80	B75 to B80
Soft	B80 to B85	B80 to B85	B80 to B85
¼ Hard	B100 to C25	B100 to C25	B90 to B100
½ Hard	C25 to C35	C25 to C35	C15
¾ Hard	C35 to C40	C35 to C40	C20
Hard	C40 and over	C40 and over	C25



Stainless Type 430



Low Carbon Deep Drawing

FIG. 1—These Olsen cup test specimens show the comparative drawability of stainless type 430, low carbon deep drawing, and stainless type 302 steels, respectively.

Stainless Type 302

during fabrication, either a dull or a bright full finish may be used. Thus, advantage is taken of the cold rolled pass in order to reduce finish polishing costs. Even on shallow draws, where either polishing costs do not enter the picture or where annealing is mandatory during forming, it is best to use the hot rolled, annealed and pickled finish. The standard polished fin-

TABLE III

Finishes for Stainless Sheet, Plate, and Strip[1] Sheet Finishes Available

Finish	No. 1	No. 2B	No. 2D	No. 4	No. 6	No. 7
Name	Hot Rolled, Annealed, Pickled	Bright Full Finish	Dull Full Finish	Standard Polish	Standard Polish, Tampico Brushed	High Luster Polish
Description	White Pickled Finish	Smooth Bright Cold-Rolled Finish	Smooth Dull Cold-Rolled Finish	Satin Finish with Fine Polishing Lines	Soft-Lustered Velvety Finish	Glossy Bright Polished and Buffed Finish
Stainless Grades	302	302	302	302	302	302
	304	304	304	304	304	304
	309			309	309	309
	316	316	316	316	316	316
	317	317	317	317	317	317
	347	347	347	347	347	347
	410					
	430	430	430	430	430	430
	446	...	...	...	...	...

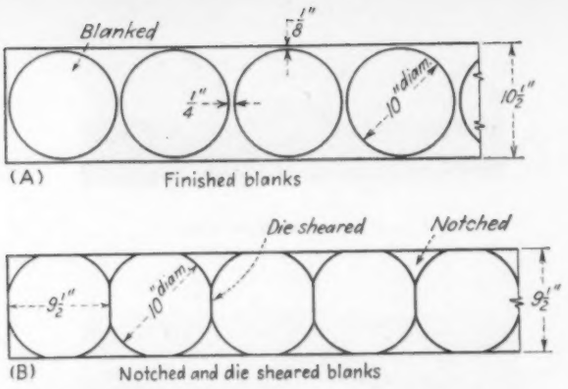
Plate Finishes Available

Finish	HR	HRA	No. 1	No. 4
Name	Hot Rolled	Hot Rolled, Annealed	Hot Rolled, Annealed, Pickled	Standard Polish
Description	Dark Oxide Finish	Dark Oxide Finish	White Pickled Finish	Satin Finish with Fine Polishing Lines
Stainless Grades	302	302	302	302
	304	304	304	304
	309	309	309	309
	316	316	316	316
	317	317	317	317
	347	347	347	347
	410	410	410	
	430	430	430	430
	446	446	446	...

Strip Finishes Available

Finish	Hot Rolled, Annealed, and Pickled	No. 1, Cold Rolled	No. 2, Cold Rolled
Description	White Pickled Finish	Smooth Cold-Rolled Finish	Smooth Bright Cold Rolled Finish
Stainless Grades	301	301	301
	302	302	302
	304	304	304
	...	316*	316*
	...	317*	317*
	...	347*	347*
	430	430	430

* Available in cut lengths only.



Material requirements:
(A) 10" x 10½" = 105 sq in.
(B) 9½" x 9½" = 90¼ sq in.

FIG. 2—Two methods of preparing circular blanks are shown here, the above example being continuous blanking and the bottom being notching and shearing.

ishes have their applications where surface appearance is important. Formability is limited and the highly finished surface must be protected during fabrication. The major advantage in using highly polished stainless is the reduction in polishing costs within the fabricator's plant.

To simplify a discussion on the fabrication operations of the stainless steels, the operations may be grouped to specific methods of forming the finished product. Thus, all operations may loosely be identified with any one of four groups: (1) Operations where a shearing action takes place, such as in blanking, punching, compound blanking and punching, die punching, perforating and trimming, etc. (2) Operations where bending action takes place. Tubular forming may be classified along with operations such as curling, expanding, beading, and bulging. (3) Operations where drawing action causes the metal to flow plastically from one form to another under a tensile loading. (4) Operations where squeezing takes place, involving, in most instances, compressive strains. This group includes coining, swaging, sizing, and heading.

In considering the first type of press operations, the mechanism of shear is important. In shearing where two blades of identical shape are used, chromium stainless compositions react like carbon steels except they do not break until a larger part of the metal thickness has been sheared. With austenitic stainless steels, work hardening characteristics must be considered. Thus, shear blades must be sharp and closely adjusted or the metal will compress and bend over the bottom blade instead of shearing. This produces undue strains upon the blades and reduces blade life. Unlike chromium grades, the austenitic steels do not break, but require a complete shear.

Shear strengths of stainless steels are much greater than those of the plain carbon steels, and, for shearing equivalent areas, greater power is required. Thus, equipment and tools must be correspondingly stronger. As a comparison, to shear 0.0375 in. stainless, the shear should have a capacity rating of not less than for shearing 0.0613 in. thick carbon steel. Properly heat treated alloy steel blades with sharp cutting edges and sufficient clearances are necessary for good shearing properties. Clearance in a shear operation is debatable, and each plant has its own practice. However, a clearance equaling 10 or 15 pct of the metal thickness to be sheared is a good starting point.

In blanking, it is customary to make the die member to size where this factor is important and the clearance requirement is taken off the punch size. The punch face is usually ground flat and any shear is ground on the die. Blanking or punching stainless steels is not difficult, but good shearing practices should be observed. Burrs on blanks can be troublesome, especially in austenitic alloys, as they work harden along the blanked edge. Where deep drawing follows blanking, burrs may retard the metal flow between the draw ring and the pressure or hold down pad. Burrs in austenitic compositions may harden to such an extent that in passing over the surface of the die ring, unless the dies are extremely hard, the surface of the dies may be gouged or scratched. On badly burred material, grinding not only effectively removes burrs, but the heat of grinding helps soften the sheared edges. The blanks also can be filed or passed between rolls set so that the clearance is equal to the blank thickness.

In many instances, rectangular pieces of sheet are prepared, the dimensions of which will yield a single blank. On strip stock, continuous or progressive blanking saves time. Continuous blanking is illustrated on the round stock in fig. 2A and on the knife blades in fig. 3. Judicial choice of blanking layout will increase blank yield, resulting in more economical use of material with little decrease in blanking time. Thus, circular blanks may be sheared as in fig. 2B; whereas, various layouts for blanking knife blades are shown in fig. 3. In fig. 3, method D is the most economical. While an additional operation is needed to reverse the strip, it is more than offset by the increase of blanks.

Hole cutting, where the punching is scrap, requires a flat die so as not to distort the work and the shear is ground on the punch. With closely grouped holes, stepped punches are used. Experience on the breakage of punches in the case of the chromium stainless steels revealed that one effective solution lies in providing ample clearance and liberal fillets in the punch design. Perforating or the punching of many identical holes in the sheet is a secondary operation that may be performed by a single or a multiple punch method. Difficulty may be experienced in multiple punching stainless steels if proper clearances are not observed and the tools are not sharp.

Although the second group of press operations includes bending, curling, bulging, necking, beading, etc., bending involves a multitude of designs, the methods available for forming being confined to several specific designs of equipment to meet specific purposes. In forming straight sections where high production is required, roll or drawbench forming is employed. On straight sections or straight flanged parts

that are limited in either dimensions or in production requirements, the power brake or the single action press is utilized. In forming contoured parts, either the three roll bender, its modification, the power bender, or the stretch press is used.

In bending, compressional and tensional stresses are involved within the same part, each being diametrically opposite of the other in relationship to a neutral axis. In uniform cross-sectional areas, the neutral axis coincides with the center line of the section. Upon application of deformation pressures beyond the elastic limit of the material, the neutral axis shifts toward the compression side. In establishing resistances to deformation, resistance will increase on the compression side of a bend as resistance on the tensional side decreases, the result of which will manifest itself by an actual reduction in thickness and cross section of the part on the tensional side. In forming stainless no unusual difficulties are encountered if the work hardening characteristics of austenitic compositions are considered. In forming these steels, generous dimensional tolerances are employed; proper bend radii are utilized in accordance to recommended procedures for a given thickness of sheet and strip; proper edge control is practiced so as to minimize edge cracking; and adequate control of springback is maintained.

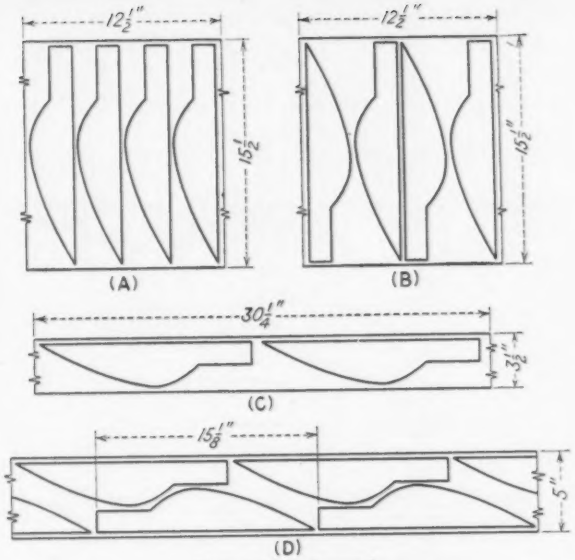
For many analyses, allowable bend radii are specified. Thus, for straight chromium stainless steels, ASTM designation A176-44 is shown in table IV.

With austenitic steels, the minimum bend radius increases with the thickness of the material and with the initial hardness. Annealed 302 can be formed to a zero radius without cracking, especially in light gages. The condition of the tools, however, often governs this factor. The bend radius and the angle of bend varies with the temper and the thickness of the stock.

Of interest is the use of highly finished stock, such as No. 4 finish, No. 6 tampico finish and No. 7 mirror finish, for architectural moldings and forms, restaurant and hospital equipment, and similar applications. A high finish sheet may be selected to reduce polishing costs of a fabricated unit or where access to polishing equipment for a finished unit is not available. Consequently, during fabrication the finish must be protected. This can be accomplished if working is not too severe by applying a coating of paste and wall paper or kraft paper to the entire exposed surface of the sheet. After the coating is dry, layout and simple forming operations can proceed without abrading the surface. This protective paper can be removed either after complete assembly or immediately after fabrication. Also, commercial brush, dip and spray plastic coatings are available for the same purpose. It is important that the sheet be free of dirt and particles of foreign matter before applying any protective coating since such may cause defects on the surface during fabrication.

In forming channel sections, high production runs of long channels can be obtained by the use of either power rolls or draw benches. In both methods, the high tensile austenitic stainless type 301 is the most generally used. With draw bench forming, sections may be as long as 100 ft with the number of reduction rolls being from four to eight sets. For high production requirements, power rolls are the most economical method. Continuous sections can be formed, the length of which is dependent only upon the size of the coil employed. This forming method is faster than draw bench forming and resetting the reductions on the rolls are not as frequent. However, higher skilled labor is required.

In draw rolling, the metal can flow naturally into the desired shape since there is no appreciable strain upon the material other than forming as it passes through the rolls. The design and methods employed in the suspension of rolls permit slippage of material and avoid



Material requirements

(A) $\frac{12\frac{1}{2}" \times 15\frac{1}{2}"}{4} = 48.5$ sq. in.

(C) $\frac{30\frac{1}{4}" \times 3\frac{1}{2}"}{2} = 53$ sq. in.

(B) $\frac{12\frac{1}{2}" \times 15\frac{1}{2}"}{4} = 48.5$ sq. in.

(D) $\frac{15\frac{1}{8}" \times 5"}{2} = 37\frac{13}{16}$ sq. in.

FIG. 3—Various methods of layout for blanking knife blades are shown here. Method *D* is the most economical, despite the necessity of reversing the strip. The calculations under each example show the amount of stock required for each knife blade by the layout.

TABLE IV

Physical Test Requirements of Selected Chromium Stainless Grades*

Stainless Grade	Tensile Strength, Psi, Min.	Yield Strength, Psi, Min.	Elongation in 2 in., Pct	Brinell Hardness, Max.	Hardness, Rockwell B Scale, Max.	Cold Bend, Deg.
403	70,000	35,000	25.0	202	88	180
410	70,000	35,000	25.0	202	88	180
430	70,000	35,000	22.0	202	88	180
442	75,000	40,000	20.0	202	95	180
446	75,000	40,000	20.0	217	95	135

* The bend test specimens shall stand being bent cold through the angle specified without cracking on the outside of the bent portion. Material up to and including ⅜ in. thick shall be bent around a pin the diameter of which is equal to the thickness of the material. Plates over ⅜ in. thick shall be bent around a pin, the diameter of which is equal to twice the thickness of the material. The axis of the bend shall be parallel to the direction of rolling. (ASTM Spec. A176-44.)

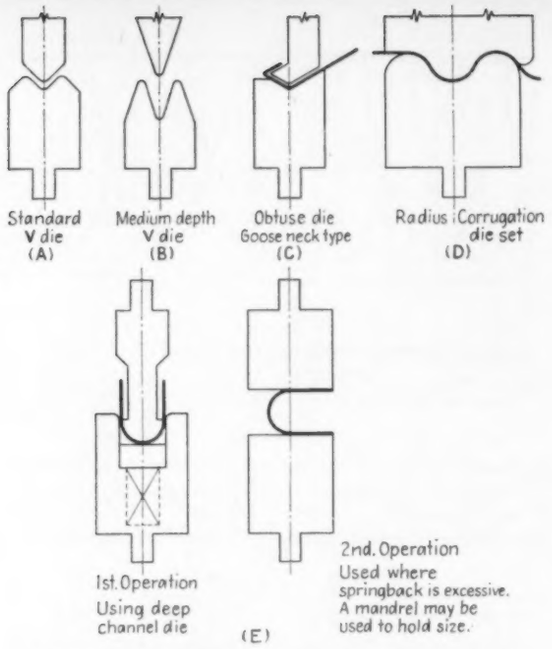

Standard V die (A)
Medium depth V die (B)
Obtuse die Goose neck type (C)
Radius Corrugation die set (D)
1st. Operation Using deep channel die
2nd. Operation Used where springback is excessive. A mandrel may be used to hold size.
(E)

FIG. 4.—The varieties of dies and punches employed in press brake forming make this a favored method in cold forming stainless steels. Angle forming, flanging, hemming flattening, offset forming, box forming, beading, curling and punching can be done on a power brake.

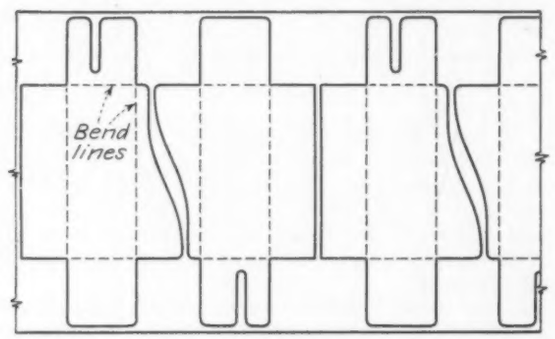
the dragging and sticking ordinarily characteristic in fixed die forming high tensile stainless steel. Drawing through fixed dies is not completely excluded since such a straightening operation may be necessary to maintain the interior dimensions. E. V. Crane claims that cold rolled strip with tensile strengths as high as 180,000 psi may be draw rolled successfully to practically any desired form, in gages from 0.002 to 0.030 in. In austenitic high tensile steels, heavier gages are seldom employed since the primary purpose in the use of this composition is to save weight by increasing strength within the formed part.

A commonly used device for channel forming where production requirements are low is the power brake. The length of the channels are limited to the brake's bed size. The brake can be used also for a simple angle forming, flanging, hemming, flattening, offset forming, box forming, beading, curling and punching. For its versatility along with the advantage that the material can be square sheared to correct length prior to forming often assures the use of the power brake. The varieties of dies and punches employed in brake forming range from the standard V dies shown in figs. 4A and 4B, which permit compensation of springback by stroke adjustment, to the multiple forming dies shown in figs. 4C and 4D. Where deep channel dies are used, as shown in fig. 4E, springback is offset where necessary by a second operation using a mandrel for size control. Springback can be difficult to control, especially in harder tempers, and, as the as rolled hardness of the stock increases, the greater will be the corrective factors to reduce springback and keep the formed part within tolerances.

In addition to dimensional inaccuracies, especially in using austenitic grades of harder tempers, brake forming may distort the part. This is attributed to the differences in cold working of the various sections within the part. In brake forming, if the die is too wide, the part radius will be considerably larger than the punch radius and result in nonconformity to design of the part and distortion in both flange and webs. On the other hand, if the die radius is narrow, the flanges may be marked at the contact line with the die because great pressure is required to form a relatively sharp bend.

Single action presses are also used for such bending operations as shown in figs. 5 and 6, but their use is limited. Where it can be utilized, forming a section usually consists of preform and finish form. Wrinkling, which may occur from shrinkage during forming, is minimized by clamping the flange between the punch and the knockout pad. This method of bending is preferable on heavier gages.

In forming contour sections, either the three roll bender and its modifications, a power bender, or a stretch press can be used. Roll bending is preferred for sections of consistent radius or where the metal is thick in proportion to the height of the section. The weakness of this method is that wrinkles on the compressive side of the bend may form between the rolls. Where radii are not constant, the power bender is used because it has the inside form of the desired radius shaped to fit the part. A pressure shoe follows the section while it is being formed. One feature of power bending is that varying cross sectional areas within the part can be contour formed. Stretch forming, of recent origin, is being favorably received because of the absence of wrinkling and the better control of springback. The stock is gripped at both ends and, while the part is



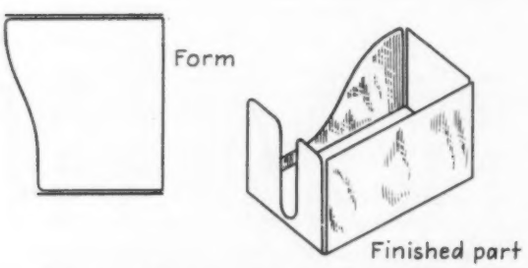


FIG. 5 — Single action presses for many bending operations, the above of which is an example. After blanking, the part goes through a preforming operation, left, and a finish forming operation, right.

under tension, it is wrapped around a form of the required shape. The amount of stretch depends upon thickness and yield strength of the material, and the height and shape of part. The amount of pull required is not established and for any specific job must be obtained by trial and error.

For deep drawing, the third classification, austenitic steels are excellent. Of the various types, 302 or 18-8 is the most widely used. Other austenitic alloys that may be deep drawn include 301, 304, 305, 308, 309, 310, 321 and 347. Type 301 has a high rate of work hardening and is considered the strongest of these alloys. It is less ductile than 302 and in deep drawing difficulty may be experienced, especially if several draws are required. Thus, 301 may draw equally as well as type 302 on an initial cupping, but on subsequent redraws less deformation can be made between anneals. There is always a good possibility of stress cracking at relatively low reductions. Types 304 and 305 perform as well as 302 in drawing, and because of their increased nickel and, subsequently, formability characteristics, these alloys are used in spinning and drop hammer forming.

The 308, 309 and 310 grades are more difficult to fabricate and should be used for drawn parts only where the fabricated parts must meet high temperature service conditions. Types 321 and 347 have less favorable formability than 302, 304, or 305. It is recognized that for best forming, higher nickel is required. Thus, the bulk of deep drawing alloys contain from 9 to 12 pct nickel. Those stainless compositions that contain molybdenum in addition to the usual nickel and chromium have formability similar to the stabilizing grades, 321 and 347. Annealed 316 and 317 have been used in rather severe cold forming operations.

The most widely used straight chromium composition is 430, a ferritic grade. Fully annealed, the ductility of 430 approaches that of mild steel and it may be used to some extent in deep drawing operations. It does not draw nearly as well as austenitic alloys, but a judicial arrangement of draw sequences along with intermediate anneals will give good results. In most instances, 430 is used for shallow draws. The martensitic alloy, type 410, is used to some extent on shallow drawn parts, but it is not recommended for deep drawing.

In drawing, there are two distinct operations, the first is *cupping*, consisting of the initial draw operation into a cup or box shaped part from a blank, and the second consisting of furthering the size of the cup or box shaped part. This operation reduces the lateral dimension and correspondingly increases the depth or length. It may be a simple reducing or sinking type operation or an ironing operation. Ironing is worth mentioning although there are but few occasions where it is employed in forming stainless steel parts. Ironing reduces wall thickness as compared to the uniform thickness of wall obtained in a simple drawing operation. A single ironing operation may reduce wall thickness as much as 50 pct. This operation is severe, and wears and fouls tool components.

In drawing a cylindrical shape, the metal is

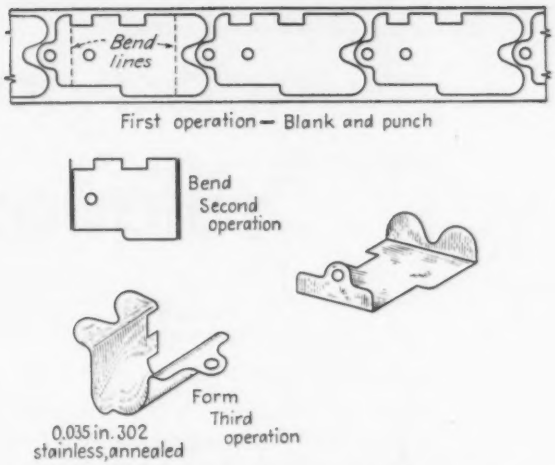


FIG. 6—This section, made of annealed 302 stainless, 0.035 in. thick, was formed on single action presses. After blanking and punching the part was preformed as the second operation and finish-formed in the third.

forced into the die by the punch, causing compressive stresses in a peripheral direction in the rim of the blank and tensile stresses along its side walls. Compressive stresses tend to buckle or wrinkle the rim of the blank, but if the draw is shallow, this may be eliminated by an ironing action in the gap between the punch and the die. To prevent this the hold down pressure is adjusted. Just as insufficient hold down pressure will cause wrinkles, too much pressure will cause the bottom of the partially drawn section to punch out before the draw is completed. Where the blank size is small in relation to the metal thickness or the punch diameter, it may not be necessary to have a hold down. Good hold down pressures can be readily obtained in either the double action, mechanical press or the double action, hydraulic press.

The punch determines the contour of the drawn section, the walls of the punch blending into the punch nose by a radius. Insufficient radius may cause rupture of the metal at that point, whereas, a too large radius may cause puckering, especially in light gage stock. If a large radius on the punch is necessary, greater hold down pressure may be required to minimize or eliminate puckering. Another factor that influences puckering is the shape of the punch. It should be cylindrical and not tapered. The die usually consists of a narrow ring that

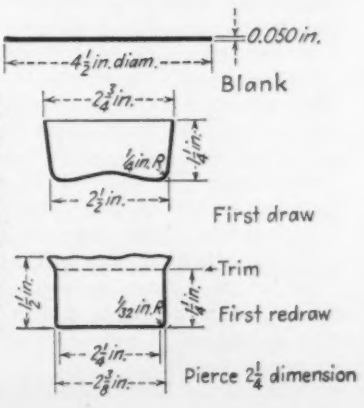


FIG. 7—In deep drawing sequences shown here, the initial cupping reduction was about 48 pct on annealed, type 302 stainless. The first redraw was 17 pct and the finishing operation included trimming and punching. An anneal after the first draw was required.

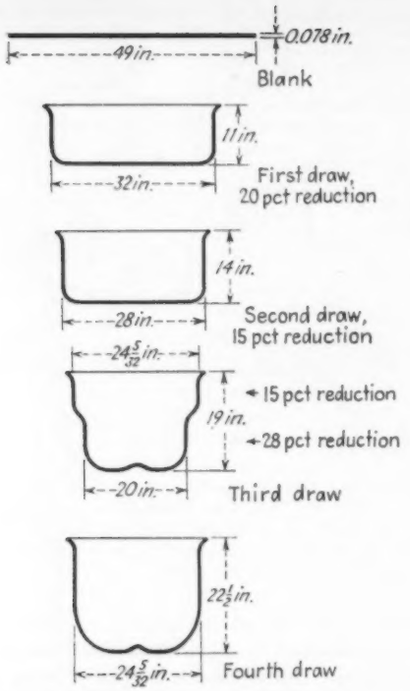


FIG. 8—This four draw sequence used a two step punch in the second redraw and a shallow reverse contour at the bottom, using a mating die with a contour bottom pad. The stock was type 302 stainless, annealed.

permits the section to be pushed through to a predetermined required minimum depth. The trimming tolerances are left on the top as a narrow flange. The ejector pad may emboss the bottom or form a shallow reverse contour. As in the punch, the radius of the die is important. If the radius is too small, excessive cold working may cause rupturing or, if the radius is too large, wrinkle formation may be excessive. Recommended radius of the punch is approximately four times the stock thickness, and the recommended radius of the die is from five to eight times the stock thickness.

The austenitic stainless steels are noted for their high resistance to cold forming because of their cold working or hardening characteristics. The alloy content together with the ratio of chromium to nickel within the composition has a definite bearing on the cold working characteristics. The supplier should be consulted on questionable deep drawn parts. The thickness of the stock is also a factor in that thickness variations should be at a minimum, especially if the part is severely redrawn. Thicker stock is preferable, but greater precautions must be taken to prevent wrinkling and puckering. In any event, all drawn material should be fully annealed since greater reductions can be realized with a minimum of wrinkling. Finish No. 1, the annealed and pickled finish, is preferred since retention of lubricant is better than on a bright cold rolled surface. Another factor that influences the extent of reduction in drawing is press speed. The slower the press speed, the greater can be the reduction. A press speed from 30 to 50 fpm is recommended.

The initial blank should be free from burrs. As stated previously, burrs retard the metal flow between the draw ring and the pressure hold down pad and are hard on dies. The proper blank size, at a maximum, is usually twice the punch diameter. A reduction on the cupping or first drawing operation is usually between 40 and 50 pct, but toward the 50 pct reduction it may be necessary to fully anneal immediately after drawing to relieve stresses and prevent stress cracking.

On successive redrawing operations, reductions may be between 18 and 24 pct. However, the amount of reduction is flexible in accordance with variables that may influence this factor. Thus, the radii on the punch, die, and draw ring; clearances between the die and punch; hold down pressures required to maintain smooth flow and eliminate wrinkling; the speed of the press; the lubricant; die condition; and whether the design permits the use of a flange will determine the actual reductions permissible.

If too much reduction is attempted in a single draw, the material will rupture; but if too little reduction is made, costs increase. Experience coupled with test will determine the sequence of reductions within a drawing sequence and the critical points of inter-spacing the annealing treatments. For experimental purposes in a succession of draws, it is better to figure one draw too few rather than one too many. Thus, while on final analysis a four draw sequence may be established, in the experimental work, it is best to work on a three draw sequence, since it may possibly work. If a five draw sequence is established, no difficulty will be encountered, but it will never be known if the five draw sequence is the most economical.

In a drawing sequence such as shown in fig. 7, the initial cupping reduction is in the neighborhood of 48 pct. This reduction is high and necessitates immediate annealing. In the second draw or the first redraw, the reduction is approximately 17 pct. The finishing operation includes piercing the bottom and trimming.

In the four draw sequence shown in fig. 8, the first cupping operation of a 24 in. diam mixer bowl consists of 20 pct reduction. It is then further reduced in the first redraw to a 28 in. diam, or a 15 pct reduction. The total reduction is 35 pct, and it is necessary to interspace an anneal. In the second redraw, a two step punch gives two diameters, the bottom having a reduction of 28 pct and the top a reduction of approximately 15 pct. The shallow reverse contour at the bottom was incorporated in the redraw operation, using a mating die with a contour bottom pad. Reverse contour drawing is practiced quite extensively, such contours being formed by stretching the metal over the recess in the punch and then forcing this stretched metal into the recess by the mating die or bottom pad. The shell was then reannealed and formed into a bowl shape in the third redraw or fourth draw.

The second part of this article will appear in a subsequent issue of THE IRON AGE, *and will cover drawing rectangular shapes and bulging; annealing, furnace equipment, pickling, passivation, tank equipment, forming equipment, lubricants, and tool materials.*

Tungsten-Molybdenum Thermocouples

Use of tungsten-molybdenum thermocouples in the study of high temperature alloys has resulted in improvement of the range of satisfactory service up to 3990°F. Metallurgical factors to be observed in order to attain optimum results from the metal components are discussed in this article and the procedure for calibrating the thermocouple is outlined. Data are also given indicating the influence of contamination on standard calibration curves.

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THE extensive program presently under way for the investigation and development of alloys for use at high temperatures has emphasized the lack of suitable means for measuring temperatures greater than about 3000°F.

For the past decade titanium, zirconium, chromium, columbium, molybdenum, tantalum and tungsten and their alloys have been examined much more closely, with the result that errors in temperature measurements made many years ago are now quite evident. For example, the literature shows pure chromium as having a melting point anywhere from 2730° to 3270°F. Recent determinations, three in number, show the value to be 3506° ± 36°F. The fault lies partly in inaccurate temperature measurements and partly in the impure metal used; however, as long as both sources can contribute to the error, one is never sure of the true temperature. Metals can now be obtained of high purity, so that accurate means of temperature measurement are necessary.

It is interesting to note that very recently the metals chromium, columbium, uranium and zirconium have been shown to have vastly different melting points than recorded in the literature.

The platinum, platinum-rhodium thermocouple has been the reference standard in high temperature measurements for a long time, and has been the only reliable thermocouple for temperatures up to 3000°F. For several years investigators have attempted to use the refractory metals in thermocouple circuits and have found some combinations to be suitable. Schulze[1], in 1932, pointed out that tungsten, molybdenum and tantalum were all well suited for measuring high temperatures. Since that time many investigators have used tungsten-molybdenum thermocouples, at temperatures up to 3270°F.

Little work has been done above this range because of lack of good reference standards. Optical pyrometers are calibrated to above this range, but their use is often precluded by the absence of black body conditions or by the presence of vapors and fumes which are usually present at these high temperatures. Standard melting point metals have not yet been established for use in high temperature calibrations because the reported melting points of the pure metals have been shown to be in considerable error in many instances; thus there are no reliable temperature calibration points for temperatures above 3090°F. Where conditions permit, if optical black body conditions are simulated

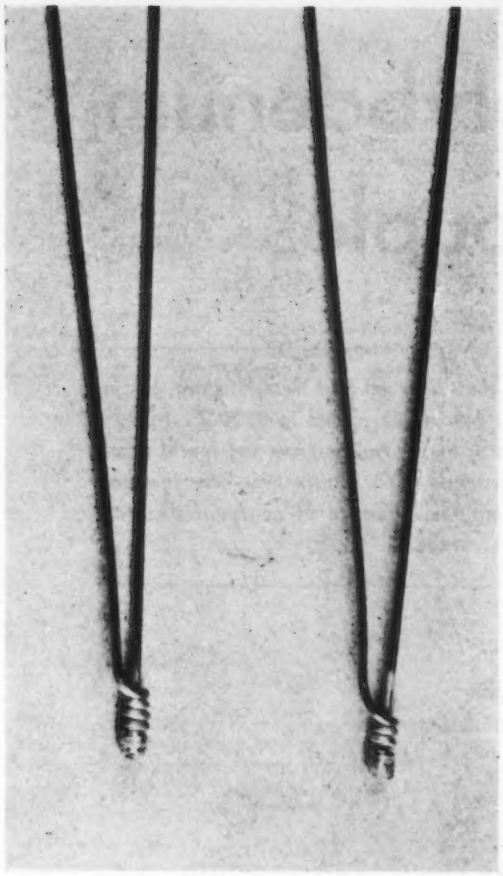

FIG. 1—View of reinforcement technique and weld. Straight wire is tungsten; wound wire is molybdenum.

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and precautions are exercised in the use of inert atmospheres, the optical pyrometer may be used for standard calibrations at high temperatures.

In an investigation of the melting points of chromium-molybdenum-iron alloys the authors investigated the possibility of using tungsten-molybdenum thermocouples in determining cooling curves from temperatures as high as 3990°F.[2]

The use of tungsten-molybdenum couples has been fairly extensive [3,4,5]. For the past 10 years they have been used with complete success at MIT in slag-metal research[6,7], where temperatures were determined over the range 2730° to 3180°F with an estimated accuracy of ±10°F at the lower end of the scale and ±20°F at the upper end. The thermocouples used in these two researches were calibrated against a standard platinum, platinum-10 pct rhodium thermocouple. Some investigators have noticed a so-called aging effect which caused a change of thermoelectric output of the thermocouple above 1830°F. Osann and Schröder[4] found that after 12 readings, the aging effect caused a slight reduction in the electromotive force. This same work had indicated that reducing or oxidizing atmospheres had no effect on the calibration after exposures up to 2 hr. The atmospheres were maintained in the protection tubes.

Fetters and Chipman[6], keeping in mind the aging effect encountered from long use of the tungsten-molybdenum couples, annealed their couples to overcome the effect. They found that aging did not occur if the couples were annealed above 3270°F, but preferably just below the melting point of molybdenum. These authors used a hydrogen atmosphere for 1 min to anneal the thermocouples. They found further, as did others, that annealing above 3270°F for 1 min completely recrystallized the wires and therefore made them stable. Higher annealing temperatures produce a more stable condition.

Due to occasional explosions in the hydrogen annealing furnace when air was sucked in, annealing gas was tried (nitrogen with 7 pct hydrogen). This eliminated the explosions; however, it was noted that for similar annealing conditions the thermocouples annealed in annealing gas yielded a lower emf amounting to about 36°F.

The size of the wire has been said to have an effect on the thermocouple output but this has not been noted in any recently reported publications.

In comparing various thermocuples for use, it is important to know the millivolt output. Clark[8], in his review of the literature, shows the following comparisons:

Thermocouple	Mv at 3000° F	Mv per 100° F
Tungsten-Molybdenum	2.5	0.375
Tungsten-Graphite	38.0	1.25
Carbon-silicon carbide.....	480.0	17.00
Platinum-platinum 10 pct rhodium	17.25	0.65
Platinum-platinum 13 pct rhodium	19.4	0.75

In spite of a low output at 3000°F the tungsten-molybdenum couple has an emf value of about half that of the platinum couples per 100° F. The low value at 3000°F is due to a reversal in emf which occurs at the relatively high temperature of 1200°F.

The use of carbon or graphite in a couple is undesirable, first because of carbon pickup by the bath in experimental work and secondly because of the need to control the moisture content closely. The presence of water alters the thermoelectric properties to read higher than normal for tungsten-graphite and to read lower for carbon-silicon carbide couples.

Calibrating the Thermocouple

The calibration work reported in this article was done using a tungsten crucible heated by self-induction in an induction coil rated at 20 kva and 150,000 cycles. The crucible and thermocouple wires were protected from oxidation by an atmosphere of purified argon, since it was found that the wires oxidized readily where a new supply of oxygen was available at high temperatures. It was found that the thermocouple and external lead-wires would pick up stray currents from the induction field wherever shielding was not adequate. Most of this pickup was eliminated by grounded shielding of the external lead-wires and by grounding one side of the thermocouple circuit.

The small diameter wires of the thermocouple (0.020 in.) were subject to heating by the induc-

tion field which caused some difficulty in the calibration and cooling curve work at high temperatures. The tungsten crucible used was only about 1 in. high and was not long enough to entirely shield the thermocouple from the induction field. At the higher temperatures, above 4000°F, localized melting of the molybdenum wire would occur at the point where the wires left the protective shielding of the tungsten crucible. Slightly melted couples rechecked in calibration tests showed very little, if any, change in calibration.

For temperatures up to 3000°F, the tungsten-molybdenum thermocouples were calibrated simultaneously against a platinum, platinum-10 pct rhodium thermocouple which had been standardized in turn against the melting points of several high purity metals and against an optical pyrometer which had been checked against a U. S. Bureau of Standards optical pyrometer. By close observance of black body conditions, the optical pyrometer was used for calibration above 3000°F and up to 4000°F. A precision potentiometer and a calibrated Speedomax recorder were used to measure the thermocouple output.

In order to avoid frequent calibration of new batches of tungsten and molybdenum wire, the standard practice in our research is to buy at least 400 ft of each wire. About four couples are made and calibrated to establish the emf temperature curve for this wire. Originally, coiled wire was used; however, it is possible now to buy 400 ft or more of cut, machine-straightened wire which is usable immediately without the tedious problem of uncoiling and straightening the wire by hand. At one time the tungsten and molybdenum wires were checked over the entire coil length for nonhomogeneous spots. None have been found to date, indicating that the wire is homogeneous. A convenient size of wire is 0.020 in., which is readily available, is relatively cheap, and fits most ceramic protection tubes.

In preparing tungsten-molybdenum thermocouples, the hot junction is best made by winding the molybdenum wire tightly about the tungsten wire for five or six turns. This is necessary in order to leave three or four turns reinforcing the junction after welding. The junction is welded quickly without fluxes. This is readily done in a carbon arc with the thermocouple connected to one side of the arc. The resulting bead should be examined closely to make sure that the molybdenum has not melted away from the bead. If the first bead is not good, it is best to cut off the coiled section and start over, since little improvement is made by trying to weld the previous bead. See fig. 1 for an example of successfully formed beads.

Next the thermocouple must be annealed. This should be done in hydrogen so as to remove traces of oxide that are usually present. The annealing can be done easily by using a vertical tube, preferably steel, through which hydrogen can be passed from top to bottom (see fig. 2). Suspended from electrical connections in the top rubber plug, the thermocouple is heated by its own resistance to the passage of an electrical current.

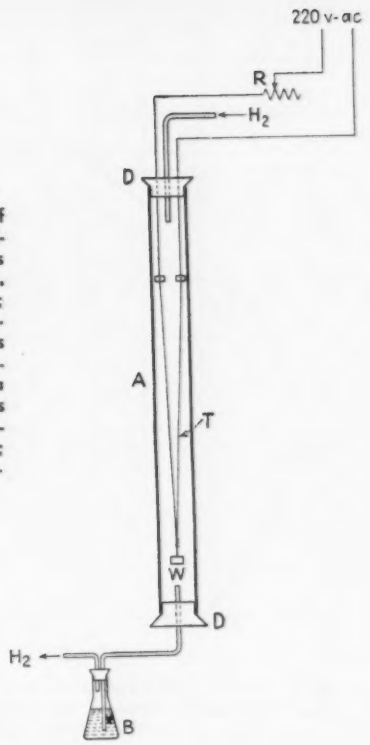

FIG. 2 — Sketch of hydrogen annealing furnace. (A) is an iron tube, 4 in. OD and 4 ft long; (D) is a heavy rubber stopper; (R) is a variable resistance; (W) is a light weight; (T) is a tungsten-molybdenum thermocouple; and (B) is a mercury bubbler.

Most investigators advise annealing the couples at temperatures close to the melting point of molybdenum. Accurate measurement of the actual temperatures reached during annealing have not yet been possible but estimates place it at least about 3630°F. Annealing is done by slowly decreasing a series resistance until the first couple melts, then subsequent similar couples are annealed at a slightly higher resistance setting than that which caused melting. This occurs in 0.020-in. wire, 27 in. long, at 220 v. ac at 37 amp for 1 min. Low annealing temperatures or short time annealing (less than 1 min) both cause a displacement of the temperature v. emf curve.

Due to large changes in gas volume when the wire is first heated or cooled, air can be sucked in, causing an explosion. The use of a mercury bubbler in the exhaust circuit of the hydrogen helps eliminate explosions within the annealing tube.

After annealing, the thermocouples are brittle and must be handled with care, therefore any straightening of the wires should be done prior to the annealing operation. The annealed couples, even though brittle, may be bent to the required shapes by heating locally in a bunsen burner to red heat and bending while red hot.

In the calibration setup used by the authors, the cold junction was established in an ice-water bath by means of a U-shaped tube filled with mercury. A highly refractory protection tip was used at the hot junction. This tip was usually 2 to 4 in. long and was wired to a cheaper, more readily available tube—usually fused quartz—to extend the hot junction out of the furnace zone. An opening in the quartz tube was made to permit circulation of argon, which was the atmosphere in the furnace for both the calibration

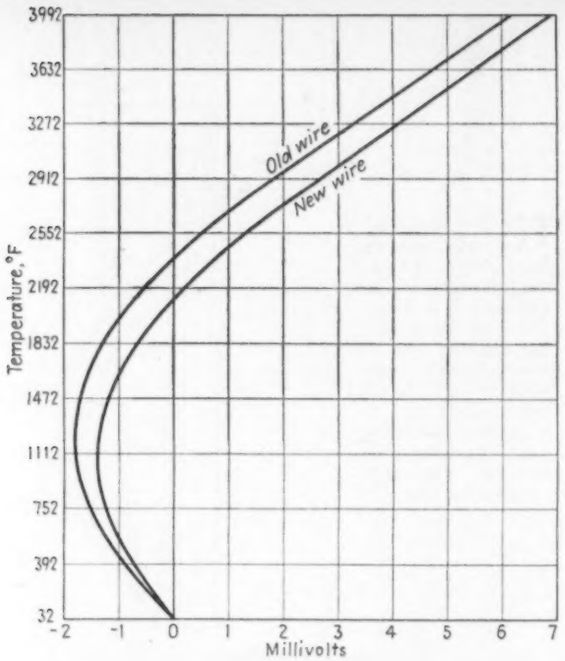

FIG. 3—Calibration curves for two different batches of tungsten-molybdenum wire showing reversal at 930° to 1290°F. Cold junction 32°F.

runs and for the actual determination of liquidus points in the chromium-molybdenum-iron system.

Two different batches of wire were used in the calibration. One was from coils of wire previously used and designated as old wire; the other was from a new batch of straight lengths of wire. Both were 0.020 in. in diam.

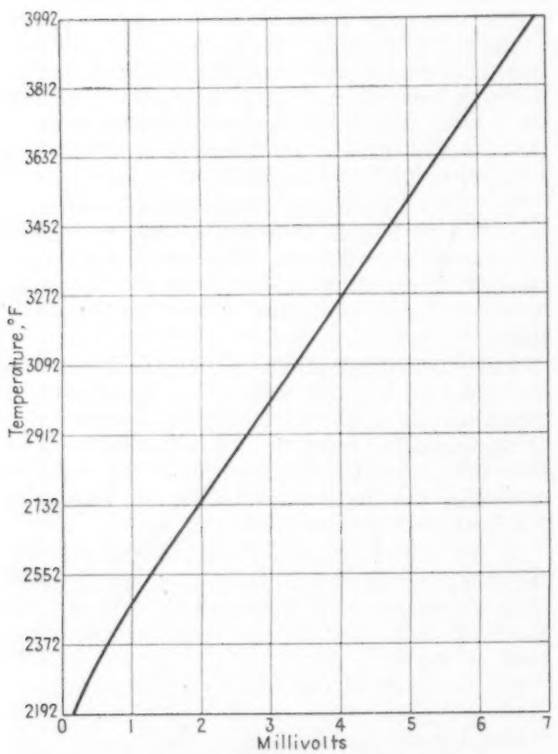

FIG. 4—Useful part of calibration curve (2190° to 3990°F) of tungsten-molybdenum thermocouples. New wire.

The check calibration of the older batch of wire conformed with previous calibrations carried up to 3100°F. Calibration of the new wire parallels the other curve with the inflection point occurring at a slightly lower temperature, see fig. 3. The curves are parabolic but approach straight line relationships above 2700°F.

Fig. 4 is a view of the useful part of the calibration wire. The indicated accuracy of the calibration is about ±10°F at the low temperature and ±20°F at the high temperatures. With contamination the curves are displaced to lower temperatures. Contaminants encountered were carbon, silicon, beryllium and oxygen (see fig. 5). The points due to contamination wire which are located below 2550°F on the curve are from couples contaminated at the higher temperatures and are not due to direct contamination at the lower temperature where contamination is fairly slow.

Fig. 5 shows a series of points obtained when the calibration runs were made in graphite using a beryllia protection tube. The standard curves are shown for comparison. When the protected tungsten-molybdenum thermocouple is inserted into the graphite block and a temperature is read immediately afterwards, the points fall on the standard curve; however, if the couple is permitted to stay in the graphite block for several readings to be made, there is a noticeable deviation from the standard to lower millivolt output. The deviations are greater at higher temperatures and may amount to as much as 180°F. When molybdenum or tungsten blocks are used this contamination does not occur. The contamination of the couples in the graphite block may have been due to silicon, beryllium, carbon or oxygen, since all were present.

In the use of tungsten-molybdenum thermocouples to obtain direct-recorded cooling curves for alloys cooled from temperatures above 3630°F, very satisfactory results were obtained. Thermocouples checked after three to five cycles at these high temperatures checked exceedingly well with the standard reference thermocouples. Since localized melting nearly always started at temperatures above 3630°F, the thermocouples were generally not used more than twice. A few times temperature readings were obtained close to 4530°F (extrapolated value) indicating that under certain conditions tungsten-molybdenum thermocouples are usable even above 4000°F.

There was a considerable problem in finding refractories to be used as protection tips at these temperatures. At temperatures up to 3100°F, fused quartz is about the best available since it is resistant to metal or slag penetration. Above 3100°F only beryllia and stabilized TAM zirconia seems to be of value. Best success was with the stabilized zirconia which withstood 4000°F, for several cycles or melting and freezing without cracking and was completely tight to metal penetration. Because it is difficult to obtain long lengths of beryllia and zirconia for sealed protection tubes of small bore, it was necessary to accept 4-in. lengths to which fused quartz tubes are wired with molybdenum wire to

protect the couple into the cold zone of the furnace.

It is believed that only several points are necessary to establish the curve for tungsten-molybdenum couples since a curve parallel to those shown above will yield the desired calibration.

This work was performed under contract with the Bureau of Aeronautics as part of a research program, and the authors wish to thank the bureau for permission to publish this work.

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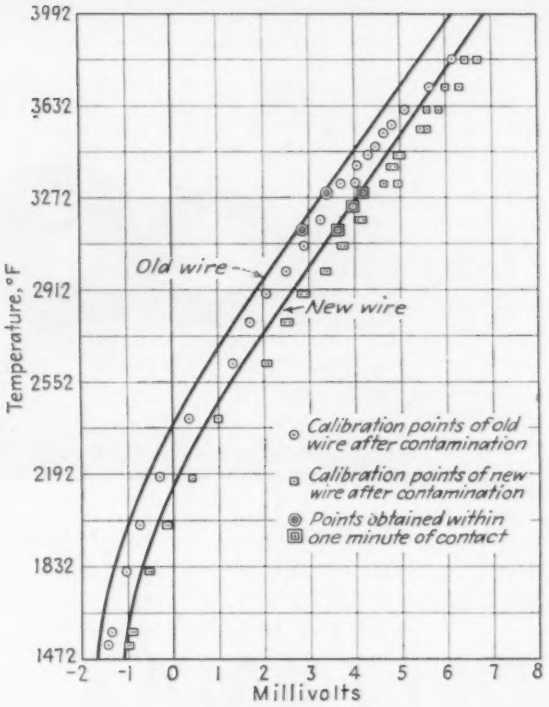


FIG. 5—Thermocouple calibration showing effects of contamination as compared with standard calibration curves. Graphite heater.

Oxygen Enriched Cupola Blast

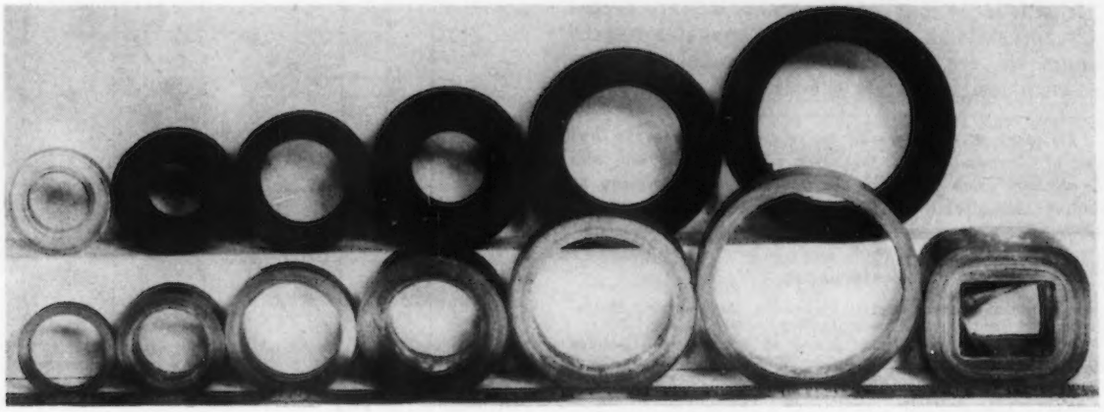
THE first recorded application of oxygen to the cupola blast was in 1923. At that time some trials were run in Belgium, according to a review of oxygen applications published in the March 1949 issue of *Iron and Steel* (London). Although these trial runs demonstrated certain advantages, especially in fuel economies, the gains realized were not considered sufficient to justify the cost of oxygen.

The next recorded trials were made in Germany, and there careful measurements were made of the effect of small additions of a few pct of oxygen to the blast, but again economic consideration would not warrant a continuance of the trials. In 1947 some results of trials made in a Russian foundry were published, and these showed that for a consumption of 2000 cu ft of oxygen per ton of iron, the coke consumption was only 6 to 8 pct of the weight of the metallic charge, and the temperature of the molten iron was 2550°F. Great stress was made of the facts that the sulfur pick-up in the cupola was less when oxygen enrichment was employed, that the molten metal had a much higher degree of fluidity and that the output from the cupola was increased by 150 pct when 31 pct of oxygen was used in the blast.

In 1948 results were published of some trials made in a small experimental cupola in the United States. Up to 10 pct of additional oxygen was used, but lining wear was increased, particularly with the higher oxygen contents. It was reported that melting losses were reduced. In Britain trials are under way, but are as yet unpublished, and it has been shown that a moderate addition of oxygen, say 5 pct, to the blast of a cupola yields results which can be very advantageous, especially to a small iron or steel foundry.

In brief, there is far more flexibility of control over the cupola when oxygen is used: the initial metal can be provided more quickly and periods of shutdown can be rapidly compensated for, the output can be easily increased by 50 pct, the temperature of the molten metal can be 120°F hotter when required and no ferrosilicon need be added with the charge, which can be entirely of steel scrap if desired.

For additional data on the use of oxygen enriched cupola blast in the United States published in THE IRON AGE, *see "Oxygen Enrichment of the Cupola Blast," April 22, 1948, p. 72; "Oxygen Enriched Cupola Blast," abstract of AFS paper, May 20, 1948, p. 82; and "Uses Oxygen Enriched Cupola Blast," Jan. 27, 1949, p. 65.*



A GROUP of toroidally wound cores made from the new 50 pct nickel-iron magnetic alloy, Deltamax.

DELTAMAX

—A New Magnetic Core Material

Development of techniques for economically producing a 50 pct nickel-iron alloy having, in addition to a rectangular hysteresis loop, sharply defined knees, low coercive force and a useful range of induction in excess of 26 kilogauses is described in this article. It is predicted that this material, which will soon be economically available as toroidally-wound cores, will find wide application in the electronics field.

o o o

By W. S. SPRING

Electrical Engineer,
Allegheny Ludlum Steel Corp.,
Brackenridge, Pa.

o o o

A NEW magnetic material, an orientated 50 pct nickel-iron alloy with a rectangular hysteresis loop, will soon be commercially available in the form of toroidally-wound cores in a number of standard sizes suitable for what appears to be an unlimited field of applications in electronics.

Perfected and manufactured by Allegheny Ludlum Steel Corp., the material, to be marketed under the trade name Deltamax, already has been produced experimentally and wound into cores ranging in weight from a fraction of an ounce to more than a pound.

Since the material has, in addition to a rectangular hysteresis loop (fig. 1), sharply defined knees, low coercive force, and a useful range of induction in excess of 26 kilogauses, an obvious application was in the production of contact converters. In addition, considerable interest has been shown in the field of magnetic amplifiers, which in many applications have been found to replace vacuum tubes advantageously. Magnetic amplifiers have been in existence for some time but have not been fully exploited because of the need of an alloy with properties offered by Deltamax. They are particularly useful where the equipment is subject to shock, as in guided missiles or where maintenance is difficult and costly, and have the additional advantage of being smaller and lighter than conventional vacuum tube circuits because of the elimination of the heavy B supply. Since magnetic amplifiers require no warmup time, they are ready for action immediately, they do not have the power limitations of vacuum tubes since heat due to core losses is not serious, they make possible a very high amplification per stage, and their time of response can be made to meet many requirements.

To obtain optimum performance from a magnetic amplifier the core material should saturate at as low a magnetizing force as possible to

minimize control power. It should saturate at as high an induction as possible. This is to reduce the size of the core, since its volume will be inversely proportional to the flux density. The knees of the hysteresis loop should be as sharp as possible to develop maximum ac voltage across the load. Since cores are generally used in matched pairs in magnetic amplifiers it is essential that their magnetic characteristics should be as near identical as possible. In short, the core material must be consistent. The core losses must be kept at a minimum to prevent power loss and a change of output power as affected by the hysteresis loss. As shown in fig. 2, Deltamax will meet these requirements. This curve is representative of cores which have been annealed in a magnetic field.

Deltamax, at least in theory, is not new. Metallurgists and other engineers for almost 30 years have recognized some of the potential characteristics of nickel-iron alloys and have been seeking a means of economically producing an alloy with the desired properties.

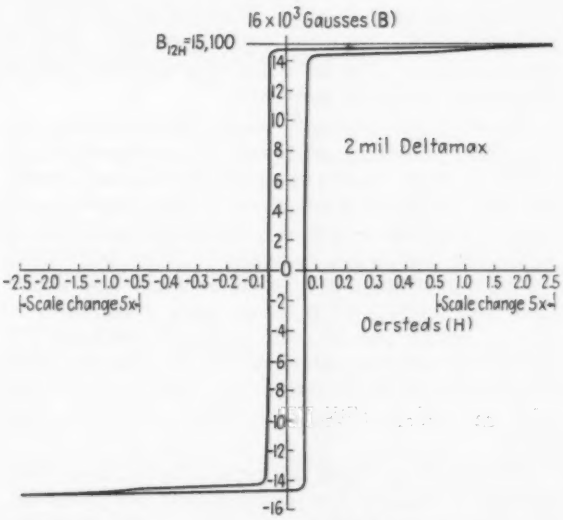
In a consideration of the characteristics of any magnetic material no single set of data is more significant than the saturation curve. It is a graphic representation of the performance of a material since it shows the quantity of flux output for a corresponding energy input. The characteristics of the usual saturation curve are well known. The output is practically commensurate with the input, up to the knee of the curve, beyond which additional induction is gained at the expense of a greatly increased magnetizing force at increased cost.

The magnetic performance of a material is a function of its metallurgical history. Basic investigations on a single crystal of iron and nickel indicate that variations in magnetic characteristics are obtained when measured along different axes. In fig. 3 are shown illustrations of the magnetic properties obtainable along three different axes in each crystal. It will be noted that for iron the <100> axes are the directions of easiest magnetization while the <110> and <111> directions represent the medium and hard directions. In the case of the nickel crystal the directions of easy and hard magnetization are interchanged and become <111> and <100> respectively, while the <110> directions remain medium. A 50 pct nickel-iron alloy is similar to iron with respect to the easy directions, but the medium and hard directions are interchanged.

From a study of the curves in fig. 3, it is evident that maximum magnetic performance would be obtained if all or most of the crystals could be oriented so that their best axes are parallel to the direction of rolling. W. S. Smith[1] was successful in producing a ferromagnetic material of this nature through the use of heavy rolling drafts and subsequent appropriate heat treatment. In the nickel-iron alloys of 40 to 90 pct Ni, Dahl and his associates[2] and Snoek[3] found that it required cold reductions of approximately 98 pct and proper heat treatment to develop the required crystal orientation.

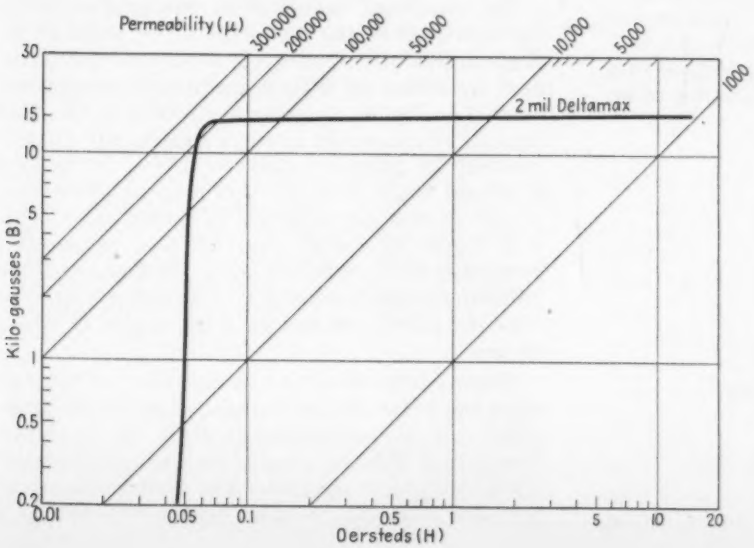
The Rhon mill, a cluster-type cold-reducing mill has been found effective in securing the necessary heavy reduction of the strip thickness. A Rhon mill now installed in the Allegheny Ludlum West Leechburg, Pa., plant was brought over from Germany by the Navy after the war for experimental work on electrical materials.

As a result of the development of a contact converter by Koppelmann[4] in Germany during World War II, a demand was created for choke



ABOVE

FIG. 1—The rectangular dc hysteresis loop possessed by the new alloy has sharply defined knees and a low coercive force.



LEFT

FIG. 2—Magnetic characteristics of Deltamax indicate ability to keep core loss and hysteresis loss at minimum.

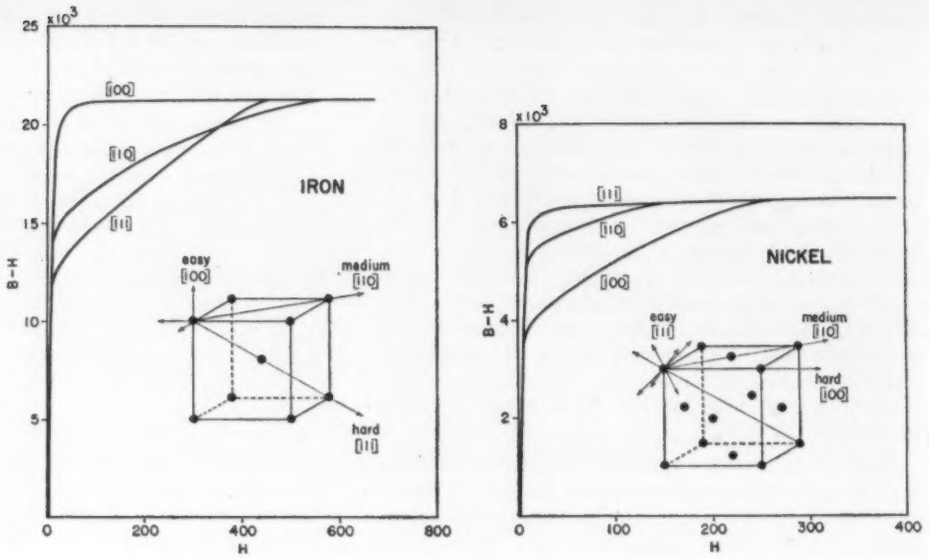


FIG. 3 — Magnetic properties and crystal structures of single crystals of iron and nickel (from K. Honda and S. Kaya, W. L. Webster).

cores having the magnetic characteristics described above. Because of the high range of induction required it seemed likely that an oriented 50 pct nickel-iron alloy might yield the required properties because of its inherently high saturation. Heraeus-Vaccuumschmelze proceeded in this direction and were successful in developing an alloy known as Permenorm 5000 Z which had these properties.[5]

The German methods were most exacting in that they required materials of extremely high purity which were subsequently melted under partial vacuum. To further reduce the impurities it was necessary to subject the material to hydrogen purifying anneals during the rolling of the material to strip. The Germans also found that the 0.001 and 0.002-in. tape could not be slit to width in its final thickness without introducing strains detrimental to the required properties, so the slitting was done at 0.014 in. and the narrow tape was then rolled to final gage.

Allegheny Ludlum undertook to develop commercial processes for producing an alloy similar to Permenorm 5000 Z. It was early recognized that there were at least two major steps in the German process which would prevent the economic manufacture of this material; (1) vacuum melting, and (2) the necessity for slitting at an intermediate thickness. By carefully controlled practices, materials of high purity were successfully melted in the electric furnace. The ingots were further processed in accordance with the German technique and after a period of development the resulting tape and wound cores were found to possess characteristics comparable with the German material.

Slitting at 0.014 in. to final width and then rolling down to 0.002 and 0.001 in. thicknesses introduced a very high operating cost. It was obvious that this part of the processing had to be modified to make it commercially feasible. A quantity of material was then processed in which the slitting was performed in the final thickness. The performance of this material, Deltamax, was found to compare favorably with the Permenorm 5000 Z. Subsequent improvement in annealing methods resulted in high retentivity, increased permeability and lower coercive force. These characteristics as well as the squareness of the knees of the hysteresis loop can be further improved following the high temperature anneal by cooling the cores in the presence of a magnetic field.

An important sequence in the production of the toroids is in the core-winding techniqe itself. Each convolution must be separated from the next by means of a light coating of magnesium oxide (see fig. 4) to prevent sticking in the final anneal, which would cause a subsequent impairment of the magnetic characteristics. If the core is wound too tightly, strains may be introduced which cannot be removed by annealing. This will result in destruction of the rectangular hysteresis loop characteristics. Because of these limitations the lamination or sticking factor of these toroids is limited to a maximum of about 80 pct.

Strains introduced in the handling of finished cores can result in impairment of magnetic properties. It is recommended that the cores be placed in a fiber or plastic case before the electrical winding is applied. The void between the core and case can be filled with oil to act as a

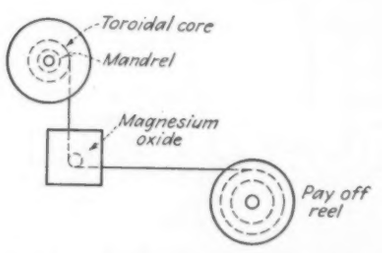


FIG. 4 — Schematic diagram of the toroidal core winder.

cushion in applications where the shock will be high.

Because of the extreme care, specialized equipment and trained technicians required in the manufacture of Deltamax toroidally-wound cores, Allegheny Ludlum plans to undertake all steps of production from melting and rolling the material through winding and sealing the cores. Equipment is being installed in the Marengo, Ill., plant of Arnold Engineering Co., a subsidiary, for production of sealed cores from Deltamax strip. These cores, manufactured in a wide range of standard sizes, will be offered commercially as soon as installation is completed.

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. . . NEW BOOKS . . .

"*Oxygen Cutting,*" by E. S. Semper. Review of modern practice in both manual and machine oxygen-cutting covers construction and use of templates for machine cutting, the accuracy obtainable, cost and efficiency considerations, special purpose and portable machines, and other aspects of the subject. Iliffe & Sons, Ltd., Dorset House, Stamford St., London, S.E. 1, England 10s. 6d. (postage 5d). 150 p.

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"*Light Gage Steel Design Manual.*" Manual for the use of architects, designers and structural engineers supplements "Specification for the Design of Light Gage Steel Structural Members" published by the American Iron & Steel Institute in 1946. It includes design charts and data on the structural properties of members cold-formed from light gage steel. American Iron & Steel Institute, 350 Fifth Ave., New York 1. $1.00. 77 p.

* * *

"*Powder Metallurgy, Vol. I,*" by Claus G. Goetzel. First volume of a three-volume work on the technology of metal powders and their products deals with methods of powder production, characteristics and properties of powders, the molding of powders into solid forms, hot-pressing apparatus and techniques, sintering, heat treating, finishing treatments and related subjects. Interscience Publishers, Inc., 215 Fourth Ave., New York 3. Vol. I, $15.00. 806 p.

* * *

"*Hardfacing by Welding,*" by M. Riddihough. Manual covers hardfacing by welding of all type metals. Information on the design of components, choice of hardfacing alloys and the techniques of depositing, inspecting and finishing is given. Iliffe & Sons, Ltd., Dorset House, Stamford St., London, S.E. 1, England. 8s. 6d. (postage 4d). 127 p.

* * *

"*Wartime Production Controls,*" by David Novick, M. L. Anshen and W. C. Truppner. Book reviews the methods of industrial production control used in the last war. Success of the policies and methods are discussed and recommendations for the future are presented. Columbia University Press, Morningside Heights, New York. $6.00. 441 p.

* * *

"*Centennial History of the Pennsylvania Railroad Co., 1846-1946,*" by G. H. Burgess and M. C. Kennedy. Historical review of the growth and development of the Pennsylvania Railroad provides statistics on this railroad as well as general information on policy and organization. Available at Union News Co. stands and at Doubleday bookstores. $3.50. 705 p.

* * *

"*Standard Metal Directory, 1948-49.*" Eleventh edition of this directory lists more than 10,000 steel mills, foundries, smelting plants, rolling mills and nonferrous metal plants located in the United States and Canada. Information on capitalization, location of plants, company officers, plant equipment, products manufactured, and primary and secondary raw materials consumed is given. Atlas Publishing Co., 425 W. 25 St., New York 1. $15.00. 999 p.

Electrolytic Polishing of Chromium

AN electrolytic polishing technique recently developed for steels, using an acetic acid-perchloric acid mixture, is equally applicable to chromium, according to a paper by P. A. Jacquet, presented at the autumn meeting of the Societe Francaise de Metallurgie, and abstracted in a recent issue of *Sheet Metal Industries* (London).

Contending that electrolytic polishing of chromium does not appear to have received accurate investigation, Jacquet expects that this method of polishing chromium-plated work will assist future surface studies of both electrodeposited and thermally-dissociated coatings of the metal on steel.

Bath makeup used is 100 parts acetic acid plus 5 parts perchloric acid, by volume. Optimum polishing voltage is 45 v, and optimum current density is 1.6 to 2.1 amps per sq ft.

The only previously-reported bath for chromium was made up from concentrated phosphoric acid plus small amounts of sulfuric and chromic acids.

Basic Metal Processing

TOOL materials and design for machining and cold forming were the basic discussions at the 17th annual meeting of the American Society of Tool Engineers, held in Pittsburgh recently. Some recent developments in cutting tool and cold forming die designs and materials for working aluminum and high alloy type steels were described, as were design trends of hot forging dies used in upsetting machines.

The society also elected new officers for the coming year at its annual meeting. Robert B. Douglas, of Godscroft Industries, Montreal, Quebec, was elected president, succeeding I. F. Holland of Pratt & Whitney. Herbert L. Tigges of Baker Bros., Toledo, Ohio, was elected first vice-president; J. J. DeMuth of Sligo Corp., St. Louis, was elected second vice-president, and Halsey F. Owen, professor of engineering at Purdue University, was elected third vice-president. George A. Goodwin, Master Electric Co., Dayton, was reelected treasurer, and William B. McClellan, Gairing Tool Co., Detroit, was reelected secretary.

The major technical sessions dealt with tooling for processing corrosion resistant steels and aluminum, and designs of upsetting forging machine dies. These meetings, with others on industrial applications of glass and metal spraying, were held throughout the three-day convention.

Elbert S. Howarth, chief of the metalworking div., Aluminum Co. of America, discussed efficiency in machining aluminum. Because of the characteristics of aluminum, there is practically no top limit on cutting speeds. Aluminum has been machined as fast as 20,000 sfpm, but it has been determined that it can be machined most efficiently by departing from practices employed in machining other common metals. For the experiments, an aluminum alloy, 75S-T4, with physicals approximating those of mild steel, was chosen. The physical characteristics of the test metals are shown in table I.

Several practices were recommended in establishing efficient machining practice for aluminum alloys. The author states that these practices are:

(1) More rake on cutting tools than is used on tools for machining steels is recommended. This wider range of rake angles for turning tools is shown in fig. 1. The exception to these is that little or no rake should be employed for machining the free cutting aluminum alloys, such as 11S. Greater rake angles apply to the softest alloys in the annealed conditions. Care should be exercised in applying rake to form tools to insure that the desired contour is achieved. While one of the rake angles may be made negative as a chip control expedient, the true rake angle should always be positive, as illustrated.

(2) Additional space should be provided for chips to form and be expelled from the tools. Aluminum alloy turnings are bulky and not as stiff as those of other metals and should have greater freedom of movement away from the work.

TABLE I

Mechanical Properties of 17S-T4 Aluminum Alloy and Hot-Rolled Mild Steel

Mechanical Property	17S-T4 Aluminum Alloy	Hot-Rolled Mild Steel
Tensile strength, psi	63,800	65,200
Yield strength (0.2 pct offset), psi	40,300	40,200*
Elongation in 4 Diam., pct	26.0	32.7
Shear strength, psi	40,500	47,000
Brinell hardness (500 Kg, 10mm ball)†	113	110
Brinell hardness (3000 Kg, 10mm ball)††	132	128

* Yield point = 44,800 psi.
† Normally used for aluminum.
†† Normally used for steel.

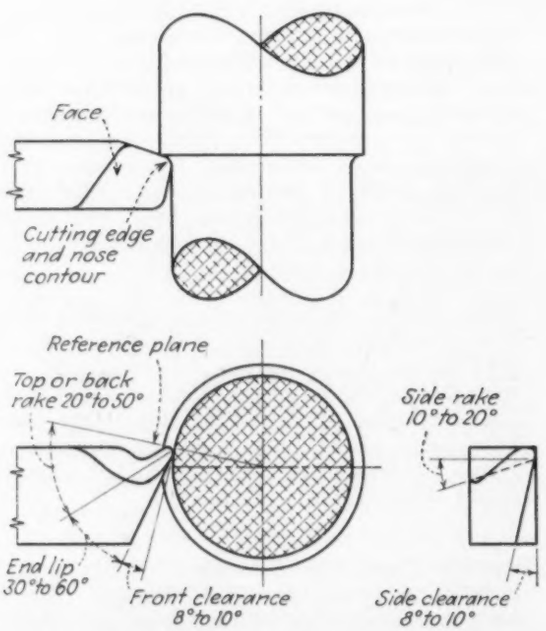

Face
Cutting edge and nose contour
Reference plane
Top or back rake 20° to 50°
Side rake 10° to 20°
End lip 30° to 60°
Front clearance 8° to 10°
Side clearance 8° to 10°

FIG. 1—Recommended tool angle ranges for machining aluminum.

Techniques Studied by ASTE

R. B. Douglas elected president . . . Die steels for stainless forming discussed . . . Tool angle modifications recommended for aluminum

Robert B. Douglas
ASTE President

(3) Tools should be designed to direct chips away from the finished work. The chips are harder than the parent steel and will mar the surface if permitted to touch it.

(4) Tool cutting edges must be kept sharp and free from burrs or wire edges.

(5) Smooth, bright tool face surfaces free from scratches permit the chips to glide over them with the least resistance.

(6) High machining speeds, moderate feeds and depths of cut are recommended. Heavy feeds and cuts increase the cutting forces and may cause the work to spring.

From machining tests on the samples described in table I, for which the physical properties were nearly the same, it was found that the aluminum test samples were about three times as machinable as the mild steel samples, evidence of which is shown in fig. 2. Likewise, the load on the tool in machining aluminum was correspondingly less than the tool load in machining steel.

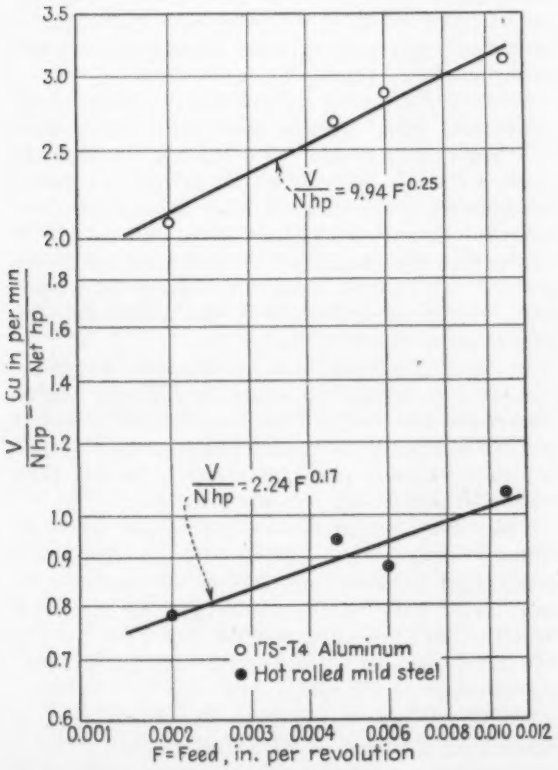


FIG. 2—Machinability of 75S-T4 compared with that of mild steel.

Discussing tool materials, Howarth stated that high carbon tool steel tools are adequate for machining small numbers of parts or when cutting speeds are low. High carbon steel drills and taps frequently outperform more expensive tools that break more easily. Abrasive resistance, availability and the reasonable cost of high speed steel tools result in their wide use for machining aluminum. Carbide tipped tools are advantageous on long production runs or where high silicon aluminum alloys must be machined.

As to lubricants, aluminum alloys are frequently machined dry when speeds are high and feeds and depths of cut are moderate. Most of the generated heat leaves with the chips

TABLE II

Recommended Reduction in Diameter of Cylindrical Deep Drawn Aluminum Alloy Shells Used On the Annealed Temper of Starting Blank

Operation	Economical Permissible Reduction
Blank (D)	
First Draw (D_1)	0.410D to 0.42D
Second Draw (D_2)	0.20D_1 to 0.25D_1
Third Draw (D_3)	0.15D_2 to 0.18D_2
Fourth Draw (D_4)	0.15D_3

TABLE III

Die Steel Recommendations for Cold Working Austenitic Stainless

Steel	C	Si	Mn	W	Cr	V	Mo	Type of Steel
a	0.95	0.25	1.60	.....	.....	.....	.....	Oil hardening
b	0.95	0.25	1.20	0.50	0.50	0.20	.....	Oil hardening
c	1.20	0.25	0.25	1.50	0.70	0.20	0.25	Oil hardening
d	1.00	0.30	0.60	.....	5.00	0.30	1.00	Air hardening
e	2.25	0.25	0.30	.....	12.00	0.80	0.80	Oil hardening
f	1.50	0.30	0.25	....	12.00	0.80	0.80	Air hardening

while the work and tools remain cool. For heavy cuts and feeds, a cutting compound is frequently necessary, often performing a cooling function. Lean, soluble oil solutions are generally employed and, occasionally, small amounts of lard oil or kerosene are added.

When cutting compounds must have lubricating characteristics, the following suggestions were made:

(1) Straight mineral oils with a viscosity of about 60 sec Saybolt universal at 100°F. (2) Straight mineral oil with additions of 5 to 10 pct of a fatty oil such as lard oil. (3) Special proprietary oils developed as a lubricant for machining aluminum. (4) Equal parts of lard oil and kerosene, but the proportions may be varied over a wide range. (5) Higher viscosity lubricants for heavy cuts and feeds as encountered in heavy roughing cuts and tapping.

As an example of efficient machining of aluminum, following the principles outlined, the author described the face milling of aluminum alloy ingots in preparing them for hot rolling. The most modern equipment for this operation was built by Ingersoll Milling Machine Co., Rockford, Ill., and installed at Alcoa's new Davenport, Iowa, plant. This machine is shown in fig. 3.

The spindle speed is 126 rpm, belt driven from an 800 hp motor. Four hydraulically actuated cylinders clamp the ingots in position on the feed table, and the table feed is at rates up to 360 ipm, with a rapid return traverse of 150 fpm. An 8 to 10 pct solution of soluble oil and water is used as a cutting compound and the chips are carried away by a chip conveyer.

The milling cutter is of the Ingersoll patented Shear Clear design and weighs about 9 tons. It is 91 in. diam, has 50 carbide tipped, inserted blades, and the cutting speed is about 3000 sfpm. As can be seen in the insert of fig. 3, large axial rake angles are employed and other angles and dimensions of the cutter are designed so that the chips are forced to coil out along the blade, away from the finished surface. Ingots as wide as 70 in. can be face milled, employing cuts up to ½ in. deep.

TABLE IV

High Speed Steels for Tools for Cold Forming Austenitic Stainless

Steel	C*	Si	Mn	W	Cr	V	Mo	Co
a	0.75	0.30	0.20	1.80	4.00	1.00	.....	.....
b	0.80	0.30	0.25	5.75	4.00	1.50	4.50	.....
c	0.80	0.30	0.20	.....	4.25	2.00	8.25	.....
d	0.75	0.30	0.25	1.50	4.00	1.00	8.50	.....
e	1.25	0.30	0.25	5.50	4.50	4.00	4.50	.....
f	1.50	0.25	0.25	12.50	4.75	5.00	.....	5.00

Factors affecting drawing and spinning aluminum alloys were discussed by E. G. Kort of the Aluminum Co. of America process development laboratories. While it was recognized that aluminum has been substituted for steel on a section for section basis in drawing, stamping, spinning and other cold forming operations, it is sometimes necessary to modify the operation sequence or die design when processing certain aluminum alloys.

In calculating the maximum permissible economical reduction in diameter per draw for deep drawn shells, table II can be used as a guide. This data shows safe values for the aluminum alloys drawn in the annealed (0) temper. Alloys that tend to cold work more rapidly should be based on lower values. For intermediate tempers, the values shown must be reduced, depending upon the temper of the starting blank.

In drawing, the die radius should not be less than four or more than 15 times the starting blank thickness. The punch radius should be held to a minimum of four times the thickness of the starting blank. If a small radius is required, a restriking operation is recommended. Liberal radii at the corners of rectangular and odd shaped shells are necessary to improve the metal flow of these critical zones.

In designing tools for aluminum alloys, the metal must be allowed to flow easily. The die radius, corner radii on odd and rectangular shells and the blankholder pressure are some of the factors in alloying metal flow.

Tools for drawing can be made of cast iron, alloy cast iron, carbon steel, alloy tool steel or tungsten carbide. For small production runs, Kirksite, masonite, hard wood or other inexpensive tool materials have been used. Tool material selection depends upon the shape to be drawn, the quantity involved and the finish desired. Tools should have a high polish, since any roughness will retard the metal flow as well as scar and mark the parts.

In general, mineral oils or compounded mineral oils have been used for drawing. Water soluble lubricants have limited success, but must be removed from the part quickly to prevent corrosion. A lubricant must perform properly in the draw operation and be easy to remove.

The characteristics of the alloy and its temper must be considered. In drawing, anything that retards metal flow is detrimental and tight tool clearances must be relieved. Blankholder pressure should be held to the minimum that will prevent buckles from forming in order to aid metal flow.

W. W. Criley, Ajax Mfg. Co., Cleveland, in describing designs of dies for upsetting forging machines, illustrated his talk with slide projections of the various types. Upsetting, gathering, coning, slitting, shearing, piercing,

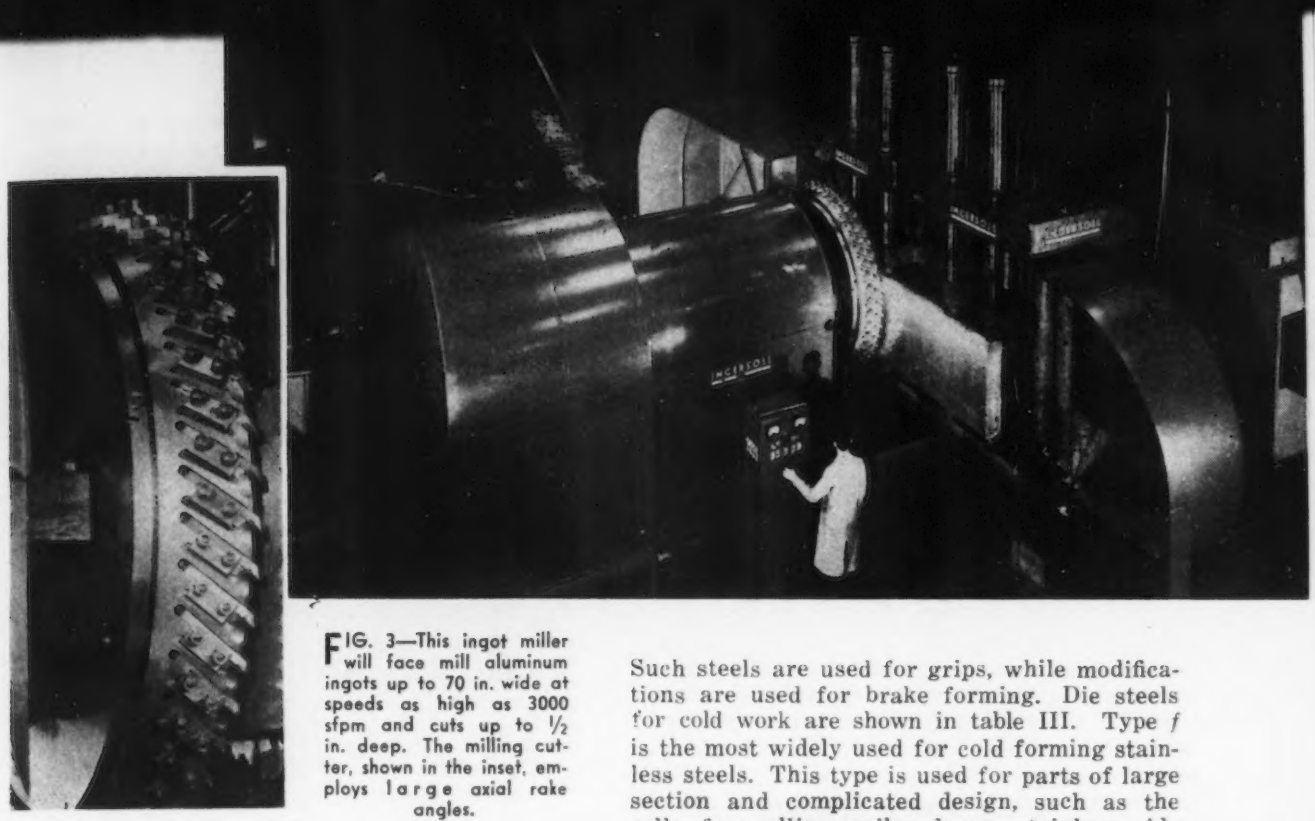


FIG. 3—This ingot miller will face mill aluminum ingots up to 70 in. wide at speeds as high as 3000 sfpm and cuts up to ½ in. deep. The milling cutter, shown in the inset, employs large axial rake angles.

and the many operations that can be performed on upsetting machines were illustrated. Both the dies and the parts in their various stages of production were shown. As the diameter, length and shape of the forgings determine the number of die passes required, the parts shown required various types of die setups and various numbers of die openings.

Of interest was the die arrangement for upsetting cylinder barrels for radial aircraft engines. The barrels were previously sheared to length because of their weight, pushed into the die and then pierced in three die operations with a fourth to expand the metal and shear off a light ring. The barrels weigh about 100 lb each. Among the parts processed by upset forging were various gear clusters, automotive axles, aircraft engine pistons, 80 lb cylinder heads, shovel handles, oil well pump rods, automobile valves, and others.

Processing corrosion resistant steels was covered by two papers, one on forming these steels and the other on machining them. Dr. George A. Roberts, chief metallurgist of Vanadium Alloys Steel Corp., Latrobe, Pa., covered the tool materials used in cold forming, with special emphasis on the forming of austenitic stainless grades. Because of the high strength, high work hardening characteristic, surface finish requirements and normally low production requirements of austenitic steels, tool material selection is important.

Mr. Roberts discussed the metallurgy of the tool steels for die materials, emphasizing that the more common high speed steels with certain alterations such as modified heat treatments or carburization are frequently satisfactory for die materials.

Special purpose steels can be used for auxiliary tooling rather than high production runs. Such steels are used for grips, while modifications are used for brake forming. Die steels for cold work are shown in table III. Type *f* is the most widely used for cold forming stainless steels. This type is used for parts of large section and complicated design, such as the rolls for rolling railroad car stainless side panels. The air hardening type *d* has higher toughness than steels *a*, *b*, or *c*, and greater deformation characteristics. Since wear resistance is in direct ratio to the carbon content, the air hardening 5 pct Cr steel has more wear resistance than oil hardening steels, but less than the high carbon-high chromium steels.

The high speed steel analyses shown in table IV are excellent for drawing and piercing dies. Since high red hardness, greatly enhanced by cobalt, is not a requirement for drawing, the vanadium modified grades are recommended for dies since the vanadium additions enhance the wear resistance of the steels. Types *e* and *f* have high toughness, over 62Rc, and are better than the high carbon-high chromium steels.

While surface treatments are not usually recommended for dies, carburization at low temperatures increases the hardness and wear resistance of type *f*. This type carburized at recommended temperatures makes excellent dies for blanking and piercing austenitic steels.

Malcolm F. Judkins, chief engineer of Firth-Sterling Steel & Carbide Corp., McKeesport, Pa., discussed machining of the corrosion resistant steels, including stainless steels of the ferritic, martensitic, and austenitic types; Stellite; Monel; magnesium, high temperature alloys; molybdenum, and other such metals.

Scale, work hardening, and other factors causing difficulty in machining were described, and tool angles, cutting speeds, feeds, and depths of cuts were discussed. The author used as illustrations specific sections of various of the corrosion resistant alloys and described satisfactory machining conditions. His descriptions were detailed, and included the individual tool angles, machining details, part analysis, section size, type of machining operation, and other necessary information for duplicating the results of the tests.

Prealloyed Steel Powders

By GEORGE A. ROBERTS
Chief Metallurgist,
and
ARTHUR H. GROBE
Research Metallurgist,
Vanadium-Alloys Steel Co.,
Latrobe, Pa.

HIGH strength parts are now being produced by powder metallurgy processes using newly developed prealloyed steel powders. In recent years, the powder metallurgy industry has attempted to adapt mixtures of primary metallic powders to demands for high strength parts, but because of the difficulty of obtaining with these mixtures a uniform product in a reasonable sintering time, a demand existed for a prealloyed powder in which each particle is representative of the composition of the whole.

Following initial experiments to produce hard, but somewhat ductile, metallic shot and grit, the Vanadium-Alloys Steel Co. obtained the rights to the F. W. Berk & Co. patented process for the production of prealloyed ferrous powders. These rights parallel those obtained by the American Brass Co. for nonferrous powders. The initial plant production unit, capable of an output of approximately 20 tons per week, is now in operation and has been successfully employed in producing a wide variety of metallic alloys, ranging from steels such as SAE 1020 and stainless steels of all types to alloys for high temperature engineering applications.

Tests of products made with these powders indicate the unusual physical properties that can be attained. A prealloyed SAE 1095 powder produced by standard cold pressing and sintering techniques, for example, yielded a product with a tensile strength of more than 60,000 psi. This same grade of powder hot pressed at 2370°F for 6 min 15 sec (a technique that combines pressing and sintering in a single application) resulted in a compact with 100 pct density.* It was then heat treated to 34 Rc and quenched in water from 1550°F, yielding a hardness as-quenched of 60 to 61 Rc. The part was then tempered at 850°F, bringing its hardness to 34 to 38 Rc. Test bars made from this piece showed tensile strengths of 158,000 to 167,000 psi.

The process for making prealloyed powdered steel consists of disintegrating a small molten metal stream with water jets. Steel of any com-

** It has been shown by tests on industrial parts that when 100 pct density is achieved the properties are equal to or better than those of parts made from wrought steel.*

position is melted in an electric furnace and transferred to a tundish, lined with a zirconium silicate refractory, and heated electrically in order to control and maintain the temperature of the molten metal. A small zirconia nozzle, of ⅛ to 3/16 in. diam, is placed in the bottom of the tundish furnace from which the molten metal falls into the disintegrating machine. Fig. 1 illustrates the general principles of the tundish and disintegrating operation.

Water Jets Disintegrate Molten Metal

In the disintegrator, the pencil-thin stream of molten metal is blasted into powder by the water jets which emerge from a hollow rotating disk through 16 nozzles placed at the outer periphery. The disk rotates at a speed of 6000 rpm and is attached to the top of a hollow shaft through which water flows at low pressure. Centrifugal action of the revolving disk builds up sufficient pressure to supply the required disintegrating energy.

The mixture of water and powder is then pumped to a dewatering system which consists of a Deister classifier, Allen slime cone and a Vortrap. The majority of the powder is collected in the cone, while the extreme fines are collected in the Vortrap. Undesired coarse particles may be separated in the classifier and discarded. The product of the cone and Vortrap, containing about 10 to 15 pct moisture, is further dewatered in an Oliver rotating filter to about 3 to 5 pct.

The product must then be dried, reduced, annealed, and screened. Two of these operations are conducted in a continuous pusher-type hearth furnace employing an endothermic, partially-combusted gas atmosphere. In the first zone of the furnace, operating at approximately 1900° F, the small amount of oxide on the surface of the particles is reduced. A second zone of the furnace operates below the transformation temperature of the steel for isothermal annealing to produce a low particle hardness. The powder is then cooled to room temperature in a protective atmosphere and is later screened to the desired mesh size.

The resulting powder has a normal distribution of sizes below 50 mesh and will be available to industry in —20, —50, —80 or —100 mesh sizes. A typical distribution of sizes on several powders is shown in table I.

Powder produced in this process is characterized by a spherical form which fosters a high rate of flow through feeding nozzles on automatic pressing machines. It also results in a higher apparent density and lower compression ratio than is normal for commercial nonspherical primary metals. Oxide content of the powder in standard carbon and alloy steel ranges can be made extremely low and the powder has proved to be quite stable with respect to oxide pickup during handling and storage.

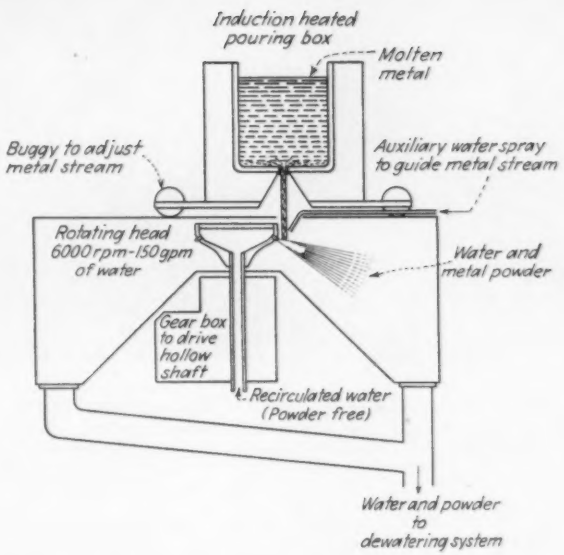

Induction heated pouring box
Molten metal
Buggy to adjust metal stream
Auxiliary water spray to guide metal stream
Rotating head 6000 rpm-150 gpm of water
Water and metal powder
Gear box to drive hollow shaft
Recirculated water (Powder free)
Water and powder to dewatering system

FIG. 1—Schematic sketch illustrating the general principles of the atomizing operation in the production of prealloyed steel powders.

The following are a few of the compositions which have been commercially produced: SAE 1020, 1050, 1095, 4620, 4650, 18-8 stainless, 18-8 molybdenum stainless, and columbium-stabilized stainless steels. Application of the process to tool and die materials is also of considerable interest and is being further developed at this time. Stainless steel powders are being tested by one manufacturer as a sprayed-on coating for parts subjected to corrosive vapors and are being successfully employed for filters in the chemical and food industries. Production of high strength gears, as well as medium strength but high wear-resistant parts, is also possible in a variety of sizes and shapes where the powder metallurgy process should prove more economical than other standard manufacturing techniques.

TABLE I

Typical Size Distribution, in Percent, of Four Prealloyed powders

Size	SAE 1015 —100 Mesh	SAE 1095 —50 Mesh	18-8 Stainless —20 Mesh	SAE 4620 —80 Mesh
−20 + 50	.....	<3	13	.....
−50 + 80	.....	17	23	<2
−80 + 100	<1	13		12
−100 + 140	21	14.5	25	18
−140 + 200	22.5	15.5		19
−200 + 325	25	17	17	26
−325	30.5	21	22	23

Noise Meter Checks Mechanical Assemblies

FIG. 1—Meter used at the end of a bearing production line provides a quick and accurate inspection method. Contact pickup is affixed to the shaft of the test machine.

MEASUREMENT of the overall noise level in mechanical assemblies offers a quick and reliable check on component parts and the exactness with which assembly has been made. The use of instruments which automatically eliminate outside or interfering noise sources have the further advantages of not requiring soundproof testing rooms and of permitting the periodic inspection of units in operation. Utilization as a maintenance instrument allows inspectors to locate incipient wear and to repair the failing part before a major overhaul becomes necessary.

The Sono-Probe, made by Aircraft Electronics Associates, Inc., West Hartford, Conn., has been designed especially with this idea of eliminating external noise. The instrument is an electronic amplier with a contact type microphone sensitive only to the actual vibrations picked up by a probe. It is therefore, unaffected by air-transmitted sound. The output of the microphone is wired both to earphones and to a sound level meter, so that quick inspection as well as accurate quantitative measurements are permitted. Amplifier volume of the instrument can be adjusted for noise levels from the ticking of a watch to the roar of a rolling mill.

The greatest interest in the instrument so far has come from bearings manufacturers, where bench models for routine inspection, fig. 1, have permitted the establishment of accurate grading standards. The meter dial can be calibrated to provide an inspection and product grading method that is just as quick as tactile methods and is substantially more dependable. Also, an inspector can usually locate the source of trouble —whether it is a loose screw or an offsize component — much faster than by other methods simply by moving the probe from point to point.

A portable model, shown in fig. 2, weighs approximately 10 lb and can be used for line testing of pumps, machine tools, diesel engines, locomotives, motors, oil burners and other mechanical units. One of the first applications of the instrument was in a large brass rolling mill where a thumping bearing could be heard but not located, in the din of a dozen mills all in operation. Rather than having to shut all 12 mills down and run them individually to locate the worn part, the Sono-Probe was taken from mill to mill and quickly located the faulty bearing.

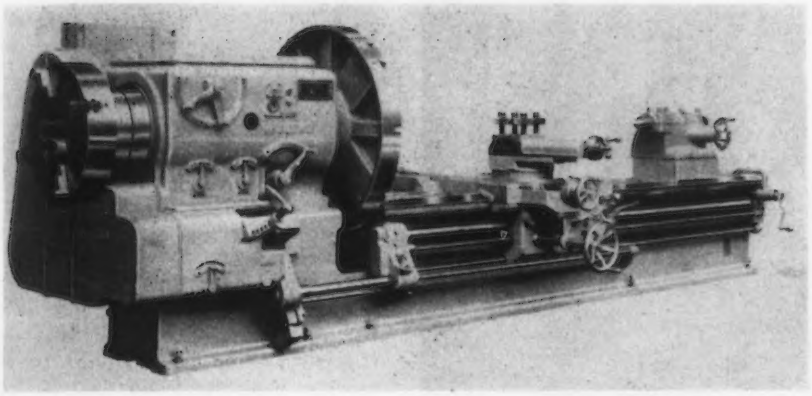
An unusual application has been in cold storage refrigeration plants where the instrument is used to detect and measure expansion of the refrigerant in the evaporator coils to assure the most economical cracking of expansion valves. It will also detect high pressure leaks and measure vibrations in the supersonic range. Airlines are using the technique for checking pilot reports of rough engines and automobile servicemen have found it helpful in locating car troubles.

The Sono-Probe was originally developed to detect vibration sources in submarines which would render the craft detectable by sound pickups on enemy ships.

FIG. 2—Portable meters are used for either final inspection or maintenance checking at critical points of large stationary units.

New Production Ideas . . .

New and improved equipment and methods described this week include: Combination and center drive lathes, a vertical broaching machine, high frequency welders, a vertical diecasting machine, a cylinder block gaging machine, standardized presses and a press control unit, a thread cutting broach, special form tools, ball bushings, welding goggles and a helmet.



A NEW combination lathe incorporating features of the 25 to 50 in. sliding bed gap lathe and the 27 in. hollow spindle lathe has a swing capacity of 60½ in. within a 5-ft wide gap and a spindle hole of 12½ in. diam. The machine offers the productive capacity of three lathes; sliding bed gap, hollow spindle and standard heavy duty engine lathes. A totally enclosed, automatically lubricated quick change box is one of the improvements, together with a geared headstock with heat treated steel gears, a carriage that permits facing the full swing of the gap and hardened and ground steel bed ways front and rear on upper bed. Large bore chucks can be fitted to both ends of the hollow spindle, and face plates may be mounted on the flange-type spindle nose. Detachable levers easily move the tailstock and the upper bed. Specifications include: Swing over bed and carriage wings, 33½ in.; distance between centers of base length bed, 8 ft closed and 13 ft extended; and 12 spindle speeds offering a range of 5 to 213 rpm, and when using a 2-speed motor, 2½ to 213 rpm. The motor recommended is 25 to 12½ hp, 1200 to 600 rpm. *R. K. LeBlond Machine Tool Co. For more information, check No. 1 on the attached postcard.*

Standardized Presses

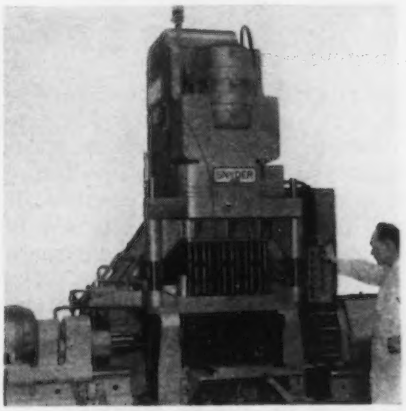
STANDARDIZATION in the Multipress line of oil-hydraulic equipment for operations on production-run and problem jobs requiring pressing capacities from 1 to 35 tons has been announced. The presses are available in seven standard sizes of compact, space-saving frames, each of which is designed for specific dimensional and tonnage requirements. Three groups of elements, interchangeable to a degree, make up the major operating components and offer a choice of combinations for varying ram speed and control. These units include the hydraulic power assemblies, cylinder and ram assemblies of several sizes, and control valves of 10 different types. *Denison Engineering Co. For more information, check No. 2 on the attached postcard.*

Center Drive Lathe

A CENTER drive lathe, the Model LR Lo-swing, automatically turns and chamfers all bearings and oil pump gears, and cuts interrupted oil grooves in cam shafts in a single operation. A special two-jaw scroll chuck clamps and drives the shaft from the cam located adjacent to No. 3 bearing. A swivel type tailstock is operated with two air cylinders. One swings the hinged upper section vertically to permit easy loading and unloading in a line parallel with the centers, thus eliminating all overhang of the tailstock center. The second air cylinder controls the movement of the spindle quill. The grooving attachment is driven and timed from the main drive shaft and imparts a shuttle motion to the grooving tool slide, that is mounted with the squaring and chamfering tools in a block on the rear slide. These cut immediately after the front turning tools have ceased cutting. All movements are automatically controlled. The operator simply loads and unloads the parts and operates the starting lever. Production at 80 pct efficiency is reported to be 80 cam shafts per hr. *Seneca Falls Machine Co. For more information, check No. 3 on the attached postcard.*

Special-Purpose Machine

PROCESSING 32 holes every 45 sec in an alloy cast iron six cylinder engine block is the purpose of a new three-way, automatic machine. The operation consists of

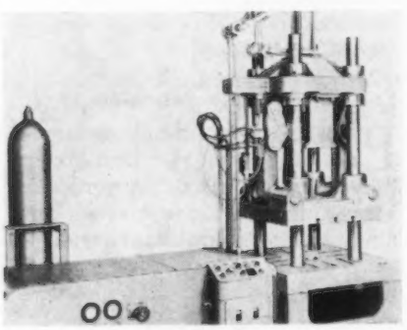


counterboring six exhaust valve insert holes, taper-reaming six inlet valve passages from the top, counterboring one hole for a Welch plug, countersinking two holes in the

rear end of the block and countersinking 17 holes in the front end of the block. Clamping is hydraulic and the work cycle is automatic, permitting the use of unskilled help. The work cycle is interlocked with the hydraulic clamping mechanism and can be started only when clamping is complete. High speed steel tools are used throughout at speeds ranging from 60 to 90 sfpm. Tool feeds are variable. The two horizontal heads have a traverse of 10 in. and the vertical 12 in. Motors are mounted on the slide units. The base is of welded steel construction, ribbed and normalized for rigidity. Production is 77 blocks per hr at 80 pct efficiency. *Snyder Tool & Engineering Co. For more information, check No. 4 on the attached postcard.*

Vertical Diecasting Machine

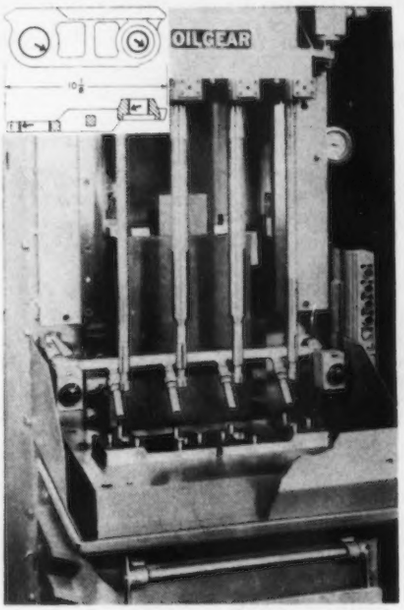
A VERTICAL type, cold chamber diecasting machine has been designed for production of parts with inserts. The machine has its die plates mounted horizontally while its die plates operate vertically. Castings with inserts can be placed in the lower die half without difficulty and the inserts remain in place throughout the diecasting cycle without falling out of



their cavity placement. Vertical design eliminates costly die construction to keep inserts in place. Model HP-22 has a self-contained hydraulic operating mechanism. It will produce castings up to 4½ lb in aluminum and has a die space 17¾ in. square between bars. *Kux Machine Co. For more information, check No. 5 on the attached postcard.*

Vertical Broaching Machine

BROACHING four holes simultaneously in right and left-hand tract link side bars is accomplished on the XP-30 x 24 vertical pull-down broaching machine. Two 1.995 in. diam tools and two 1.366 in. diam tools finish broach to size and to accurate center distances at the rate of 270 parts per hr. Approximately 0.040 in. stock is removed from the diameter of each hole. Tool handling is automatic.



Parts loaded into the fixtures are accurately located automatically by tool shanks. No clamping or threading of the work over the tools is necessary. Lubrication of the tool and work is positive. Broaches are secured at both ends during the broaching stroke. Machine operation is semi-cycle; broached parts are removed before tools return to loading position. *Oilgear Co. For more information, check No. 6 on the attached postcard.*

Screw Machine Drill

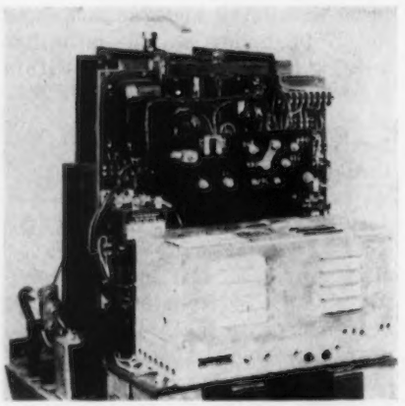
DESIGNED for hand and automatic screw machines and chucking machines, a new heavy duty, spiral fluted, carbide tipped drill is manufactured in standard sizes running by 64ths from 3/16 to ¾ in. It is made in short lengths, 3 in. on the smaller diameters to 6 in. on the larger. It can be used in any application where jig bushings are not required. *Super Tool Co. For more information, check No. 7 on the attached postcard.*

Speed Reducer

A NEW, double reduction, horizontal type speed reducer has ½ hp output capacity with 1000 in-lb output torque, the ratio ranging from 10:1 to 3840:1. Overall dimensions are 8½x7x7½ in. Input shaft diam is ⅝ in. and output shaft diam is 1 in. Aluminum alloy housings, phosphor bronze worm gears, 20° pressure angle gearing, ground thread worms and Timken roller bearings are other features. *Euclid Universal Machine, Inc. For more information, check No. 8 on the attached postcard.*

High Frequency Welders

A NEW high frequency welder employing a tube-type oscillator and a specially designed torch has been approved by the FCC, as it eliminates communications interference. The new oscillator is a full-wave, self-rectifying type, using a single tube. It is self-contained with few component parts. The modified torch is tuned to preserve freedom from interference while transferring high frequency energy from the oscillator to the welding arc. The Sureweld Gasarc welder is produced in six models ranging from 150 to 750 amp capacity. The oscillator and torch are available separately for

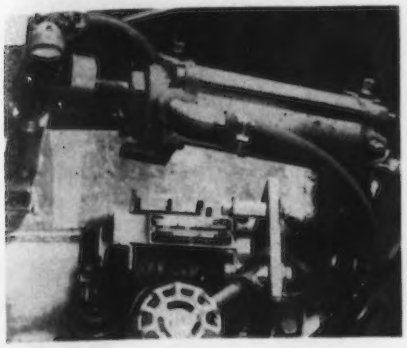


use with other welding machines. *National Cylinder Gas Co. For more information, check No. 9 on the attached postcard.*

Spot Welder Arm Adjuster

AN attachment for the electrode arm on pedestal type spot welders permits high flanges or reinforcements to pass through before lowering the electrode to proper welding height. Four units comprise the device: a two tube electronic timer with dial control that can be mounted anywhere; and an attaching link; an air cylinder; and an air solenoid that are mounted on a single plate behind

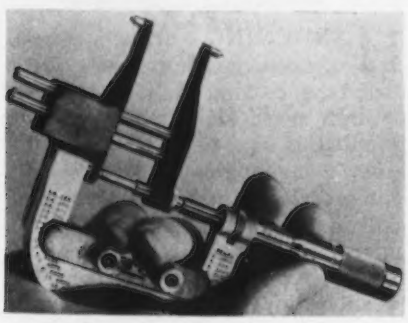
the welder. The attaching link is adjustable for height and has a roller on top to make it easier for the air cylinder to push it under an



extension to the rocker arm. This closes the welding points to a predetermined spacing to permit embossments or flanges to clear through before the points close for welding. The timer works in conjunction with and controls the operation of a regular 3B welding timer by simple adjustment of the dial. *Resistance Welders Service Co. For more information, check No.* 10 *on the attached postcard.*

Improved Microdapter

THE method of mounting on the micrometer frame and the location of the zero adjustment of the Microdapter have been improved. The Microdapter is an attachment for outside micrometers that permits taking precision internal measurements. Added clamping bars simplify attachment and improve rigidity. The new mounting method is faster, maintains posi-



tive alignment with anvils and insures accurate readings. The attachment clamps instantly and securely to any micrometer frame and measurements are read directly on the regular thimble. A preset zeroing adjustment matches distance between tips with the micrometer opening. Once set, measurements are duplicated with any micrometer. Microdapters are available for 1-in. micrometers covering a ½ to 1-in. range; for 2 in. covering 1 to 2 in., and for 3-in. micrometers covering 2 to 3 in. *Rimat Machine Tool Co. For more information, check No.* 11 *on the attached postcard.*

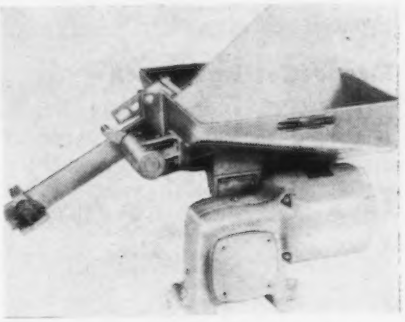
Cylinder Block Gaging Machine

EACH of the bores in the V-8 engine block can be checked at four different points with a new gaging machine developed for automobile manufacturers. The cylinder block comes directly to the gaging machine on a roller conveyer where it moves into position on a turntable. It is locked in the proper position by hydraulically actuated shot pins. The operator lowers the four gaging spindles into the cylinder bores by pressing the electrical *down* button to start the inspec-

tion operation. Should any of the spindles fail to enter the cylinder bores, a micro-switch will stop their downward travel instantly and signals show where interference is being encountered. The spindles are then retracted. Each gaging spindle has four sets of air jets to make four separate checks in each bore. The positions of the floats in the 16 glass tubes indicate if each bore is within specified tolerance limits for taper and diameter. By turning a handle directly under the glass tubes, the operator rotates the spindles 180° and obtains a full 360° check for out-of-round. One tube in each group indicates the classification in steps of 0.00025 in. The operator stamps this information on the block with symbols, using a manually operated device. *Sheffield Corp. For more information, check No.* 12 *on the attached postcard.*

Automatic Hopper Feed

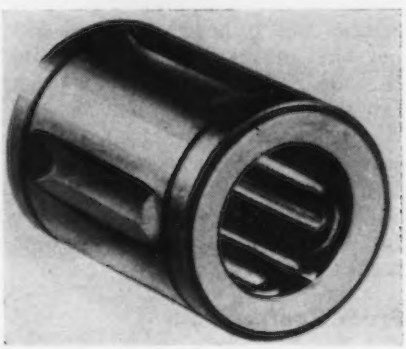
AN automatic hopper feed that can be attached to centerless grinders, induction heaters, punch



presses and other special machines and fixtures, is self-contained and powered by a ¼ hp gearmotor that also serves as a pedestal for mounting. It will feed such work as bolts, screws, machine and wood screws—cylindrical and headed or shoulder work from ⅛ to ⅜ in. diam and 4 in. long. *Feedall Machine & Engineering Co. For more information, check No.* 13 *on the attached postcard.*

Ball Bushings

DESIGNED to impart long life and low maintenance to linear moving mechanisms, a new ball bushing, the Series B Commercial Grade, offers low-friction, elimination of binding and chatter, lasting alignment, and the solution to many linear lubrication problems. The bushings employ the principle of ball recirculation enabling unlimited, frictionless linear travel. When using these ball bearings, it

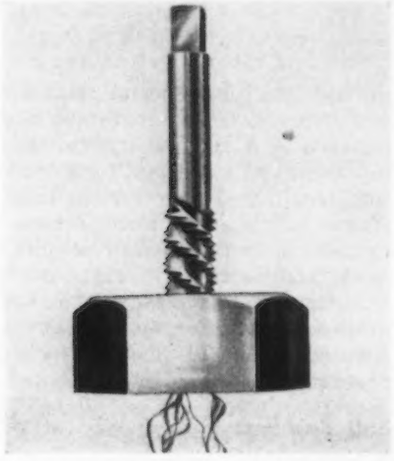


is said designers can frequenly scale down the size of an entire mechanism as the free rolling, antifriction characteristics of the bearing permit lower length of diameter ratios because of cocking and binding considerations. The reduced friction assures smooth, effortless operation and permits higher operating speeds. Series B

ball bushings have case hardened steel parts and are produced for ¼, ½, ¾ and 1-in. shaft diameters. *Thomson Industries, Inc. For more information, check No.* 14 *on the attached postcard.*

Thread Cutting Broach

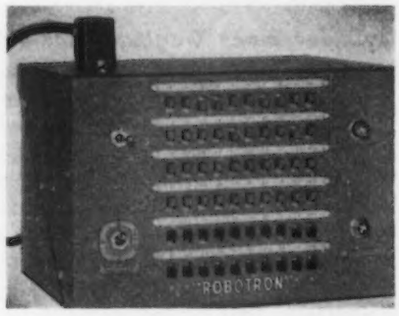
A THREAD cutting broach is said to generate a perfectly threaded hole by a true broaching action. Chips being removed are curled up in one piece and flow out



of the hole being threaded, preventing interference with the cutting action of the broach and breakage due to clogging by the chips. The manufacturer claims the broach is practically unbreakable because of the low torque required to form the thread. Tool life is long and the broach may be resharpened on a tool and cutter grinder. It is said the broach requires one half the power required for tapping, works equally well in most materials, does not bind or seize in the hole being threaded. The tool may be used in tapping machines, automatics, turret lathes, or any machine adapted for a tapping operation and is interchangeable with standard taps. *Shearcut Tool Co. For more information, check No.* 15 *on the attached postcard.*

Press Control Unit

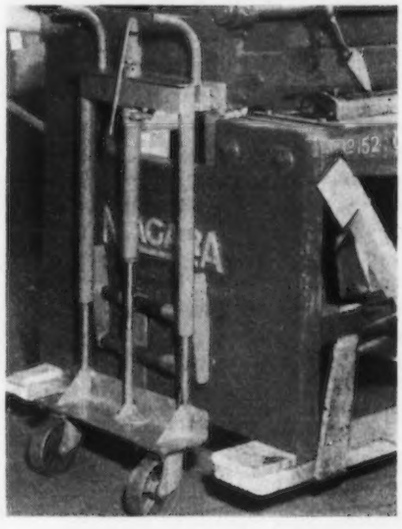
AUTOMATIC bumping operations on hydraulic presses can be performed with a new control unit, the Robotron, that can be set to give from 1 to 40 bumps during any one cycle of operation and to control the overall cure time. The unit is equipped with three built-in time arrangements, any of which can be selected by a flip of a switch. Limit switches regulate the press opening during the bumping operations, close the press after a predetermined time, and hold the press closed until the next bump. A range of 21 different cure times for each



setting of the time range switch is provided. Bumps can be timed to be alternating or consecutive. Push buttons provide instant control of press operations. The Robotron operates as a positive electrical switching device and does not employ gears, cams or adjustments of any kind. *Emmett Machine & Mfg., Inc. For more information, check No.* 16 *on the attached postcard.*

Crate Lifting Unit

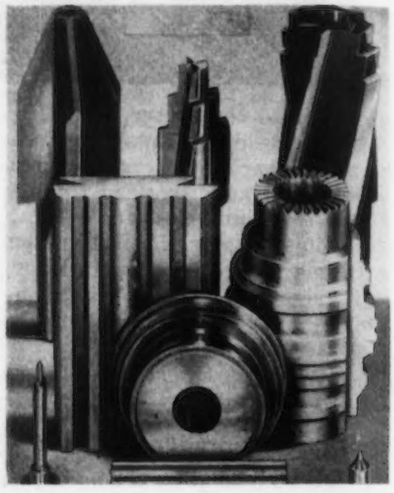
IN handling crated or uncrated materials and products, Rol-A-Lifts are used in pairs and are moved about like hand trucks. In loading a crate, one unit is placed



at each end with forks inserted underneath. Each Rol-A-Lift is then jacked up, lifting the crate and putting it on wheels, ready to roll. After the load is moved into place, it is lowered gently to the floor at controlled speed. Units are built in 2000, 4000, 6000 and 8000 lb capacities. The manufacturer claims that the Rol-A-Lift will handle loads too heavy or bulky for fork trucks and will move loads into tight places where neither fork trucks nor cranes can operate. *Skarnes Engineering & Supply Co. For more information, check No.* 17 *on the attached postcard.*

Form Tools

A RANGE of special form tools manufactured of Carbalt super, high-speed steel include circular and flat tools, counterbores,

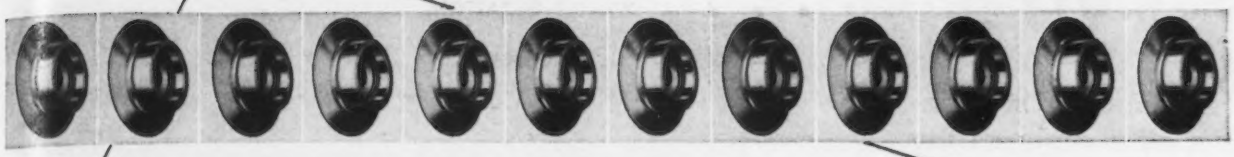


reamers, recessing tools, flat drills, punches, rolls and heading dies. Trade-named Micro-Keen, they are claimed to accurately produce more pieces per grind, reduce down time and increase production. *Johns-Hartford Tool Co. For more information, check No.* 18 *on the attached postcard.*

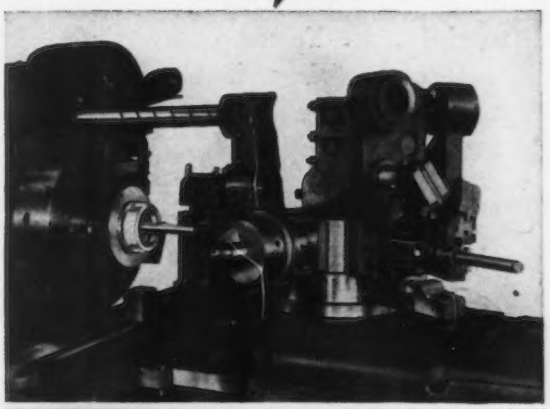
Steel Hardening Compound

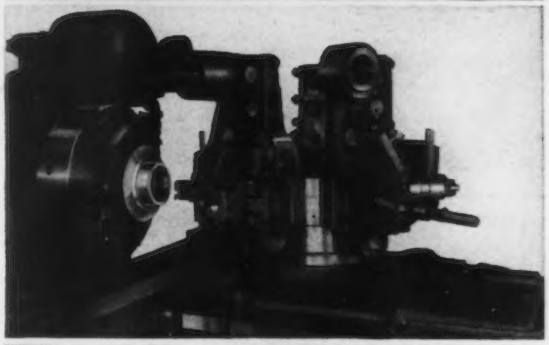
HARDENING drills, chisels, gouges, caulkers, reamers, dies, taps, cutting tools, any carbon or high speed steel in a matter of minutes, is said to be possible with a new compound called Hi-Speed-It. The process is simple and no special skill or special equipment is required. The object to be hardened is: (1) Heated to a cherry red color in an ordinary plumber's torch or an open forge or furnace. (2) It is then dipped, rolled or stirred in a gray powder. (3) Fifteen to 30 sec are allowed for the powder to fuse and form a crust, after which the object is again dipped lightly in or sprinkled with Hi-Speed-It. (4) The object is reheated cherry red and then quickly quenched in clean, cold water or brine. Depth of hardness is controlled simply by repeating the first four steps before quenching. High speed steels are proc-

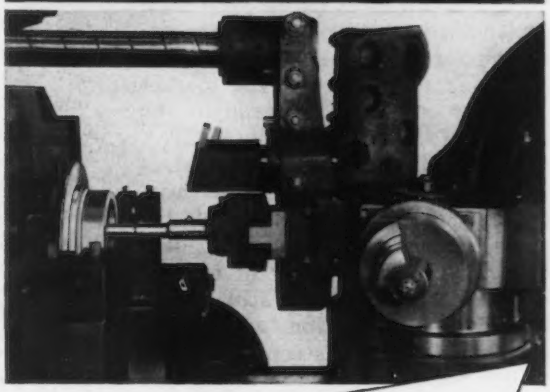
BECAUSE P&J TOOLING IS PRECISION BUILT



PRODUCTION MEN FIND fewer rejects FROM P&J AUTOMATICS







The automotive industry applies Potter & Johnston Automatic Turret Lathes extensively to quantity production of interchangeable parts, many so intricate that they require upwards of fifteen to twenty successive operations on one machine. Significantly, the modern quality control inspection methods used in the big automobile plants demonstrate the ability of P&J Automatics to produce work that meets these exacting standards . . . with fewer rejects.

Back of this successful performance record is P&J tooling . . . as planned with the aid of experienced P&J engineers who know how to work out a job — as indicated by these setups to produce the differential case pictured above — operation by operation in correct sequence, turret face by turret face. There is no substitute for the skill and know-how of these men. That is why Potter & Johnston machines plus P&J tooling mean better parts and more of them at lower cost. And that is why we suggest that it may be very much worth your while to send us sample parts or prints and see what we have to recommend.

Potter & Johnston Company

Pawtucket, R. I.

subsidiary of Pratt & Whitney Division Niles-Bement-Pond Company

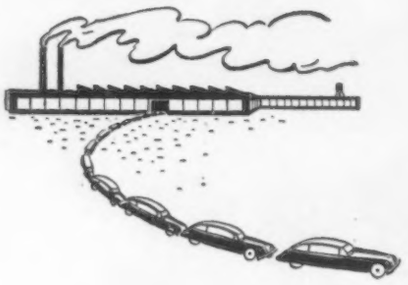
P&J

AUTOMATIC TURRET LATHES

Assembly Line . . .

WALTER G. PATTON

• Demand for steel ingots off sharply as the market for finished automotive steel hangs on . . . Kaiser-Frazer introduces its new "Utility" model . . . Taxes are fastest growing business factor.



DETROIT—At the moment, the automobile industry faces one of the most paradoxical situations in its history. While the demand for finished steel remains almost as firm as ever, the market for raw steel ingots made in the electric furnace has broken badly.

A few weeks ago auto manufacturers were buying ingots from every possible source; today, the same kind of tonnage is going begging. A large number of electric furnace ingots are still being bought for conversion to flat-rolled products in the second quarter. Firm commitments for ingots for conversion during the third quarter, however, are being made with the utmost caution, according to informed sources here.

There is at the moment a vast reshuffling of second quarter ingot schedules. A very sizeable tonnage has been cancelled; some buyers have moved their schedules up. In other instances prices have been renegotiated at a lower figure. From a top price last fall of $115 per gross ton for ingots, the price has fallen at Detroit to $70 or less. Ingots are piling up, it is reported, at several steel mills. As many sources see the situation, the price of ingots may fall even lower before it stabilizes.

To understand this rapid transition it is necessary to see what has happened during recent months to the market for conversion steel. For the past several years, appliance manufacturers and the motor car and farm equipment producers have been the principal customers for ingots that were later converted into flat-rolled products. The demand by appliance users began to fade several months ago. This eased the situation somewhat insofar as the automobile industry is concerned. Ingot stocks were quickly built up and turned over to the steel mills for rolling. The auto industry recently reached a point where either it had arranged for all the steel it needed or thought it could see the necessary ingot tonnage in sight.

Seeing its first real opportunity during the postwar period to get out of the ingot business—which was something it never liked anyhow—the motor car producers have been back-tracking as rapidly as conditions would permit.

Why all the hot haste to get out of the ingot business? Simple arithmetic tells the story. Various estimates placed the percentage of high priced conversion steel the auto industry has been using at 20 to 30 pct of the total steel requirements. In the case of many independent producers this ratio is admittedly higher; only one or two companies, it is believed, would have a lower ratio than 20 pct.

Most conversion steel users say the average cost of finished steel obtained by buying electric furnace ingots for converting at the large steel mills is $100 over the mill price. Assuming a 20 pct ratio of conversion tonnage to total tonnage, the premium steel adds approximately $20 per ton to the average cost of all steel used for an automobile.

ASSUMING gross steel requirements of 3000 lb of steel per car, the car producer can save an estimated $30 per car by purchasing all his steel at mill prices. Admittedly, the $30 estimate is much desired goal; it is far from a reality at present. The figure is high so far as some producers are concerned, but the estimate is known to be low insofar as some of the independent car builders are concerned.

It should be emphasized that the present situation is not static. If car sales should boom during the next few months, conversion will necessarily have to continue at a substantial rate. If the seasonal pickup in the auto market is only moderate—and the demand for steel by other industries falls off—the demand for electric furnace ingots is certain to be greatly reduced during the third quarter.

Although few observers here expect the auto market to fall on its face, if this happens the lush market for high priced steel ingots will disappear quickly from the American scene.

When conversion goes out the window a surprisingly large number of steel foundries and a half dozen electric furnace steelmakers will lament its passing. Large steel producers who have swelled their earnings substantially by means of their conversion contracts are going to notice the difference. But to the increasingly cost-conscious car makers, the demise of steel conversion will be mostly an occasion for celebration.

The auto industry may actually be so pleased with the turn of events it may be half-willing to forget its scattering of noncancellable conversion contracts or the several millions it has invested in steel mills, blast furnaces and coke ovens to stretch the country's available steel supply during the postwar period. In several instances, it is believed that these investments have already nearly paid off in increased output of cars and service parts.

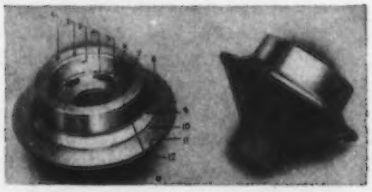
THIS ONE MACHINE

EQUALS THE PRODUCTION OF TWELVE TO FOURTEEN CAPSTAN LATHES

From Coventry, England, comes this enthusiastic report of the Standard Motor Co., Ltd., on the BULLARD Type D Mult-Au-Matic.

A BULLARD Type D 8-Spindle Mult-Au-Matic used in the up-to-date plant of the Standard Motor Co., Ltd., Coventry, England. Note the compact, space-saving design.

The work. A cast differential gear case, before machining.

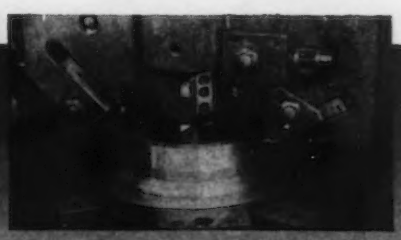


The same casting after completing one cycle (through 7 work stations) on the BULLARD machine. Arrows indicate the 12 machined faces . . . . Piece time: 2 minutes!

According to a leading British automobile manufacturer, the BULLARD 8-spindle Mult-Au-Matic is an excellent example of modernization of production machinery . . . with particular emphasis on its ability to perform 12 machining operations — entirely automatically — in 2 minutes' piece time! Case histories show why BULLARD Mult-Au-Matics are internationally recognized as outstanding among multi-spindle manufacturing equipment . . . key factors in the present world-wide effort to cut the time and costs of production.

BULLARD Mult-Au-Matics are rugged versatile machines designed to cut manufacturing cost on a wide variety of jobs. These are not exclusively high production machines since case histories show reduced manufacturing costs on short runs of work. Individual speeds and feeds at each station provide correct cutting conditions for various diameters, operations and a wide variety of cutting tools. Study the manufacturing economics of the Mult-Au-Matic Method as applied to your work. *The Bullard Company, Bridgeport 2, Connecticut.*

Send prints of your jobs for engineering estimates. Refer to ad MD 122



Close-ups of 2 of the 7 fully automatic work stations, showing several tools cutting simultaneously.

WILLOW RUN — Henry Kaiser's latest entry in the automobile sweepstakes—a many-purpose "utility car"—marks the second attempt by an automobile producer (Willys-Overland is the first) to fit a car to a specific market.

Combining the function of a four-door sedan with an all-metal station wagon, the new utility model will make its bid not only to the one-car family but to a large number of specialized transportation users. As K-F stylists see the market for their new car, the latest model out of Willow Run should be particularly attractive to campers and tourists, police departments for scout cars and ambulances, fire departments, most salesmen, firms making package deliveries and public utilities.

Two models are being offered. The Traveler priced at $2088 plus taxes is now in production. A luxury model, the Vagabond, will be introduced later this spring.

K-F officials see in the new design a "single car for every family transportation function."

Outwardly, the new K-F appears to be a 4-door sedan. (IRON AGE, Jan. 13, p. 74.) The rear loading door is split horizontally, with the lower half swinging downward to become a tailgate. The top panel, which includes the rear window, swings up and out of the way to provide access to a very large storage area.

A collapsible rear seat enables the car to carry six passengers comfortably. Wheelbase of the new model is 123½ in. Overall length with the tailgate down is 224 in. With the rear seat folded up and without extending the load beyond the tailgate, carrying capacity is 130 cu ft. Maximum dimension of the storage area is 10.1 x 3.8 ft.

Special heavy duty springs and shock absorbers are used. At the present time K-F is producing 250 Travelers per day, or about 75 pct of its total car output. Cars started going to dealers this week. The car sells for $240 under the lowest price Kaiser.

* * *

GM'S annual report to stockholders always offers an exceptional opportunity to study the rate at which the various U. S. business factors are changing during the postwar period.

For instance, listed below *in the order of rate of change* are the various factors for General Motors, the country's largest business enterprise. **All comparisons show the postwar changes in GM operations, 1948 being compared with the 1936-41 average as 100.**

Provisions for income tax 360.
Inventories 330.
Net sales 290.
Payrolls 280.
Net working capital 255.
Net income 230.
Total assets 220.
Net property account 202.
Net capital employed 185.
Number of employees 160.
Dividends 130.

Other significant disclosures in the GM report are: GM's 1948 percentage of passenger car sales was 40 pct, the same as 1947 and compared with 44 pct in the 1936-41 period. Truck sales amounted to 35 pct of the truck industry in 1948 compared with 32 pct in 1947 and 39 pct in the 1936-41 period. Truck sales in 1948 for the industry were 27 pct of the total vehicles compared with 19 pct average in the prewar period.

GM statisticians say U. S. employment in 1948 was 18 pct above 1941; the number of families was up 14 pct and the average disposable income per family after personal taxes was up 84 pct. After taking into account the reduced purchasing power of the dollar, the disposable income of the average family in 1948 was 28 pct more than in 1940 and 13 pct more than in 1941.

Where GM dealers have not "followed sound and equitable policies the corporation has either cancelled or failed to renew the selling agreement of that particular dealer." (The report does not indicate how many dealers are affected.) GM's Detroit Transmission Div., now under construction, will employ 1500 persons. A new Buick special series which will have Dynaflow as optional equipment is planned for introduction later in 1949 (probably about mid-summer.) The GM production of diesel horsepower has multiplied 2½ times since 1941. In less than 16 years GM has produced approximately 62 million diesel horsepower.

The Electromotive Div. of the corporation which manufactures diesel-electric passenger, freight and switching locomotives is now utilizing more than 3 million sq ft of floor space. Electro-Motive has five combination branch repair shops and parts warehouses and two additional parts warehouses in six states. Output of Frigidaire refrigerators passed the million mark for the first time during 1948. GM has 220 engineers, metallurgists, chemists, physicists and other technicians assigned to advanced engineering, design and research.

CLEVELAND BOUND: *March 15 marked the opening of the navigation season on the Great Lakes. Shown in the photograph are 1949 Chevrolet passenger cars and trucks ready for shipment on the Steamer T. J. McCarthy, the first freighter to sail from Detroit. More than 250 cars were shipped on the first boat. Chevrolets are bound for dealers in Cleveland and other Ohio points.*

WITHSTANDS HIGH WORKING TEMPERATURE

*

SAVES SPACE

*

PERMITS IMPROVED DESIGN

. . . to help you design better generators, motors, transformers

Vega Chromoxide, exclusive with Auto-Lite, is an enamel insulation which will withstand high heat. This improved product combines the refractory qualities of Class B insulation with the high space factor and flexibility of enamel. Every executive and engineer should know about Vega Chromoxide and the complete range of applications where it provides unusual advantages. For further information write to

THE ELECTRIC AUTO-LITE COMPANY
Port Huron *Wire and Cable Division* **Michigan**

Exclusive with —

AUTO-LITE ELECTRICAL WIRE and CABLE

TUNE IN "SUSPENSE!" . . . CBS RADIO NETWORK THURSDAYS . . . CBS TELEVISION TUESDAYS

Washington . . .

EUGENE J. HARDY

• Uniform military catalog underway . . . Expansion to cover all government items seen . . . Aid to standardization . . . Industry sure to benefit by elimination of confusion in government procurement.

WASHINGTON—Despite considerable valid criticism of the slow progress of unification of the military services there is at least one segment of unified effort which is producing results. This work is centered in the Munitions Board Cataloging Agency, which has well underway a uniform cataloging project designed to establish a single name, description, classification, and number for each item used, purchased, stocked, or distributed by the Army, Navy and Air Force.

While the MBCA's project is aimed primarily at a military catalog, the ultimate objective is a single catalog for the entire government. To further this ultimate objective, the executive committee which sets policies for the MBCA has among its membership a representative of the Bureau of Federal Supply, who represents the civilian agencies of government, in addition to officials of the Army, Navy and Air Force. Then too, 85 pct of all items purchased by the government are used by the military, which means that the military catalog will provide a sound base should Congress ever authorize an overall catalog for the entire Federal government.

Completion of the catalog will mean that the same item, from an ordinary thumbtack to heavy machinery, will have a distinctive designation which will identify it within a bureau or service, or between the departments. This single item characterization will then be used for all functions of supply from original purchase to final field or area of distribution. While designed primarily to aid the user within the government the catalog should be of great benefit to industries supplying the government, for as pointed out by the Hoover Commission on Government Reorganization, with a uniform system of identification "order can replace the current disorder in computation of requirements in relation to inventories and operating programs; procurement; storage and issue; disposal and other phases of the supply function."

THE need for such a catalog is obvious. Had it been available during World War II, countless lives and millions of dollars could have been saved. While similar items were stocked by the three services, interchangeability in the field was almost impossible because of the differing systems of identification in the military services. In the Bureau of Federal Supply and the three military services there now exists 17 unrelated systems and listings in the form of catalogs. With a top estimate of some 12 million items used and stocked by the government, and current inventories amounting to $27 billion, the resulting confusion is almost beyond comprehension. There is also a Federal Standard Stock Catalog which was originally designed to be used throughout the government, but it has been out of date for a dozen years and even more important, its use is not mandatory.

Antifriction bearings have often been used to illustrate the horrible mess which differing systems of numbering and identification can bring about. For example, the Hoover Commission in its study of government supply services found that bearings identified by 300,000 different numbers were actually only 9000 different bearings.

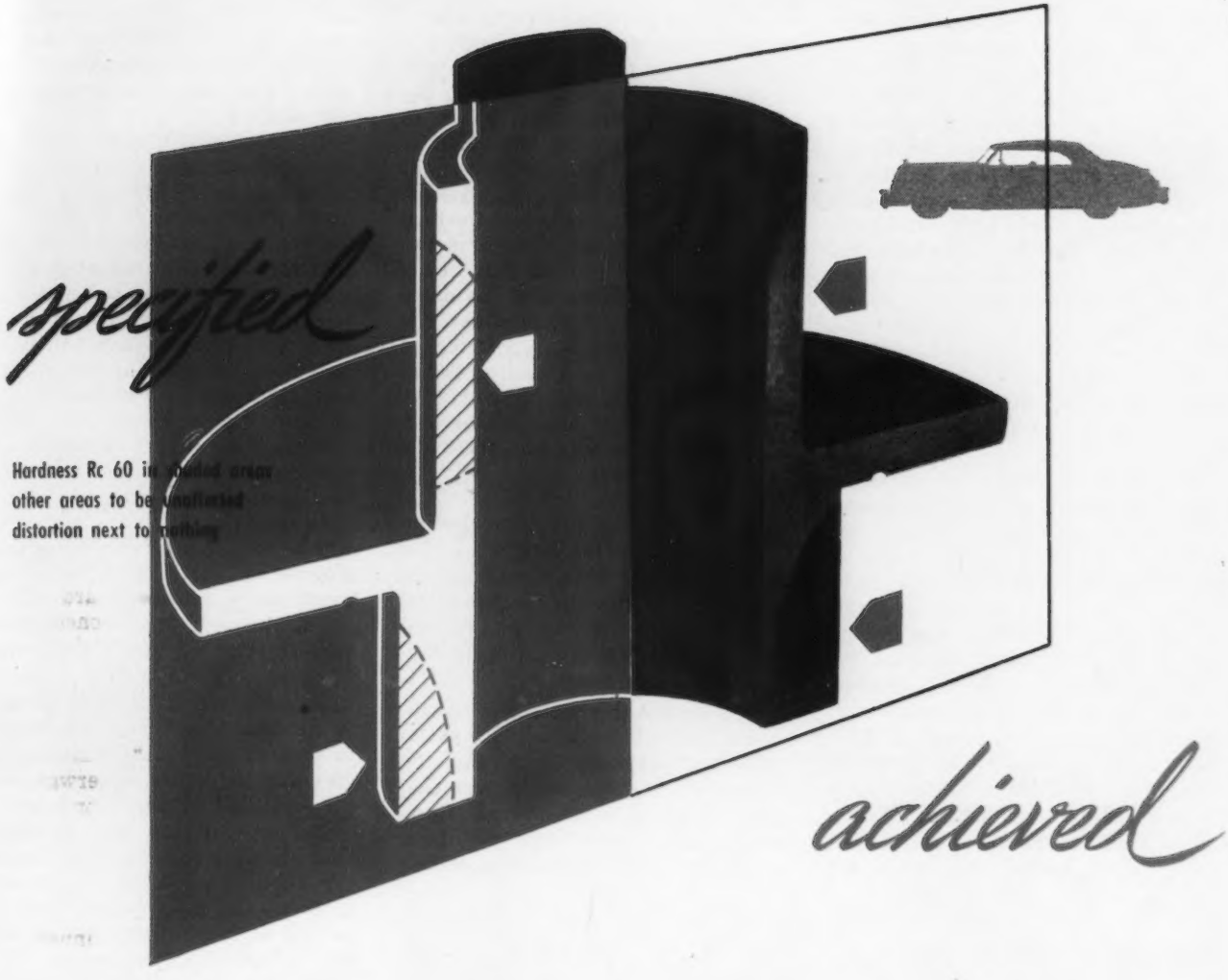
Another example revealed that one manufacturer of steam turbines furnished a bearing liner assembly to the Navy at a cost of $63. Catalog research revealed that another supplier furnished the same item, as a replacement part, at a cost of $25. This research also revealed the identity of the prime manufacturer from whom the bearing liner assembly was later obtained for $9.06. Such examples are legion throughout the government.

The current work on a single uniform stock catalog stems from a Presidential order in January 1945, which directed the Bureau of the Budget to set up a United States Commodity Catalog. The next two years saw much planning and indecisive discussion of technical details, but very limited progress toward the actual preparation of a catalog.

The Congress rejected a general plan for a catalog system prepared under the direction of the Bureau of Federal Supply in the summer of 1947 and suggested instead that the various agencies concerned, combine forces and ideas and present a request for clarifying and implementing legislation. Since that time practically no grogress has been made in the field of cataloging by civilian agencies.

HOWEVER, the presence of staff members of the Bureau of Federal Supply on MBCA executive and technical committees, indicates that an active effort will be made to expand the military catalog. The lop-level staff of MBCA is composed of 3 men who have been working on the project since the Presidential order was issued in 1945. They are, the director of the agency, Lt. Colonel F. G. Wood; deputy director, George C. Brown;

another part for a torque converter transmission



by flamatic selective surface hardening

The etched section of the hub shown above is clear unmistakabl proof that Flamatic hardening can put the heat – and the hardness – where you want it. This SAE 4150 hub is routinely Flamatic-hardened at the rate of 140/hour, faster by far than previous method, and **with a minimum of rejects.** High temperature flames confine heat to **specified areas;** electronic temperature control holds hardening temperature within plus or minus 5°F of **specified value,** and holds distortion within **specified limits.**

Flamatic work size capacity is large: gears up to 16" OD, selecte surfaces on shafts etc. up to 24" in length. Productive capacity is high. Results are virtually **100% predictable.** Write for informative booklet of case histories, or send us a part print for analysis and quotation.

flamatic

THE CINCINNATI MILLING MACHINE CO

Cincinnati 9, Ohio, U.S.A. • CINCINNATI

and technical consultant on item identification, R. P. Courtis.

The MBCA was set up by Secretary of Defense in May 1948 and set itself a 4-year goal beginning July 1, 1948 for completion of the military catalog. It has just begun to issue actual descriptions and code designations of the first items to be cataloged. The final numbers and descriptions are printed on 5x8 cards. THE IRON AGE was shown the final copies of the first two of these before they were sent to the printers last week. Ironically enough, the first two cards cover ball bearings. At the present time about 3000 items have been coded and described. These are primarily bearings and electronic equipment. The agency expects to complete the first 100,000 cards by July 1 and an additional 800,000 in the next fiscal year.

The final catalog is expected to show 2,500,000 items used in the military services and 500,000 additional items which are peculiar to the needs of civilian agencies. This will mean elimination of about 50 pct of the 5,000,000 cataloged items now listed by the National Military Establishment.

However, before the cards are sent to the printers, a great deal of preliminary work is necessary. Description patterns are set up and circulated to agencies using the item before actual descriptions of items begin to come into MBCA. The names and descriptions of the items are then gone over and made as simple as possible before the final cards are approved. The first two on bearings contained only the 7 digit code identification, the name of the item, and 19 lines of description which generallly consisted of not more than 3 or 4 words. As the cards are completed, they will be distributed to the bureaus and services using the item and their use will be mandatory.

IN addition to the inter-agency cooperation the MBCA has also had excellent cooperation from industry on the furnishing of item descriptions. An Industry Advisory Council is now being set up to further this cooperation.

The agency also contemplates separate publications which will group classes of commodities and give the new name, number and description patterns of the items covered. However, no decision has yet been reached on the publication of the actual descriptions. Cross-reference cards are also planned so that the bureaus and services can tell at a glance which agency stocks the item in question.

The catalog will also be a big aid to the standardization work of the Munitions Board Standards Agency and will be particularly helpful in determining interchangeability. The Standards Agency was set up at the same time as the Cataloging Agency to develop unified agreement on military specifications and to develop agreements among the Army, Navy and Air Force on standard designs of equipment and component parts.

While the military catalog is proceeding satisfactorily under the direction of the Secretary of Defense, it is apparent that some legislation will be needed before an overall catalog for use throughout the government can be gotten underway.

The Hoover Commission in its report emphasized that a declaration of congressional policy insisting upon a Federal Commodity Catalog is necessary to insure conformity of some of the old line civilian agencies and to insure continued military-civilian cooperation.

The commission also indicated that enabling legislation to further the work of the MBCA might also be desirable. It was pointed out that as long as the military catalog work has to rely on allocation of funds from the three different military services "it will not be able to operate as an impartial and uninhibiting group."

THE BULL OF THE WOODS — BY J. R. WILLIAMS

I THINK TH' BULL'S DESK SHOULD BE PAINTED WHITE, SO AFTER ONE OF YOU GREASE MONKEYS HAS BEEN IN, US BEAU BRUMMELLS COULD BE WARNED, "NO SWIMMING!"
THAT WOULDN'T SAVE SOME OF YOU INTELLIGENTSIA! HE SAW ME IN HERE--HE SAW THIS GREASY GEAR ON TH' DESK-- HE'LL BE SITTIN' IN IT IN A MINUTE!
J.R.WILLIAMS
COPR. 1949 BY NEA SERVICE, INC. T. M. REG. U. S. PAT. OFF.
THE ELBOW GREASE 4-1

Rise in Prefab Output

Washington

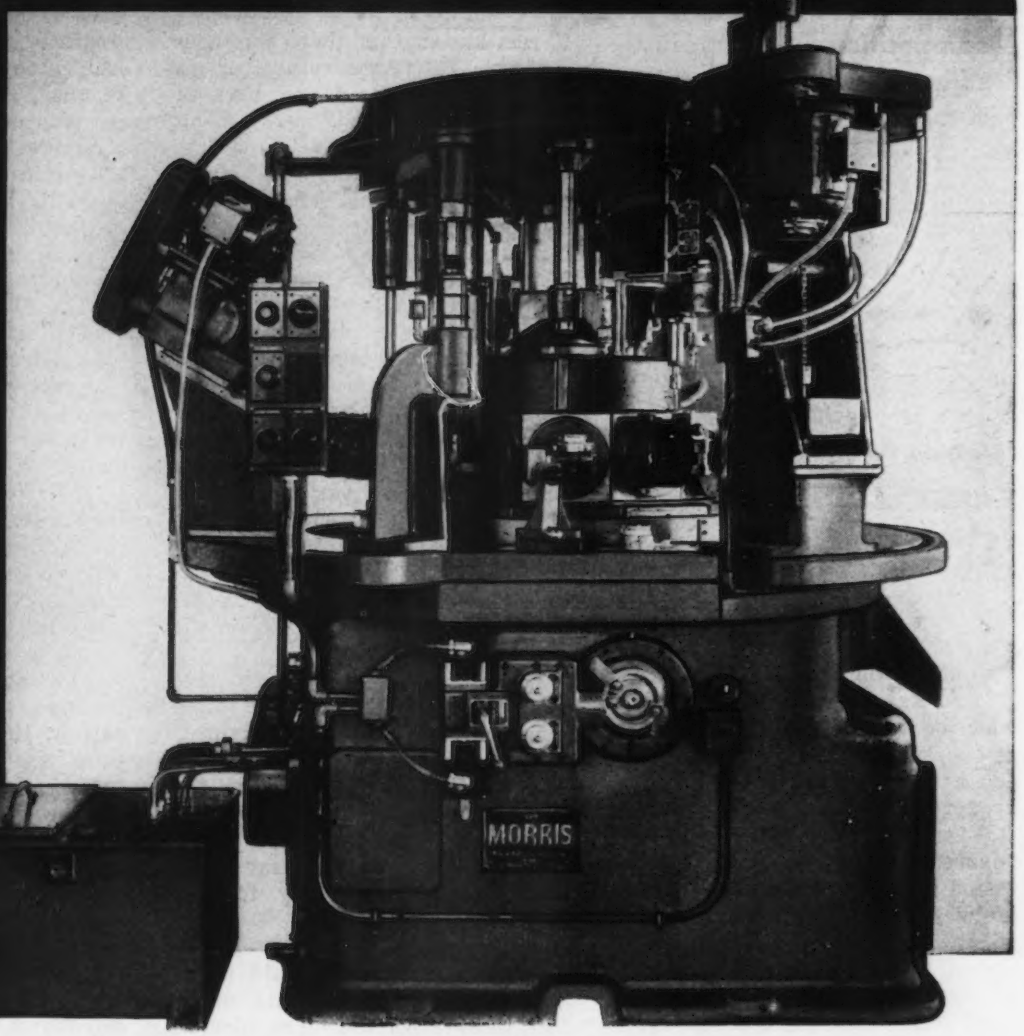
• • • **Prefabricated** wooden buildings rose from eight to ten-fold in favor last year, according to Census Bureau reports which show that more than 50,000 such units were shipped by the industry last year. About half the total were for dwelling purposes.

Meanwhile, the industry reports that it expended more than $3 billion in new plants and equipment last year and increased its employment to about 8500 workers last year. About 1750 held such employment in 1939.

A breakdown of last year's wooden prefab output indicates a total of 24,550 dwelling units, 12,650 barns and other farm structures, 5100 garages, and 7700 miscellaneous structures.

Production is Automatic on this

MORRIS MOR-SPEED Production Machine



● High production and low costs are essential under prevailing conditions today. To help you meet these conditions at favorable costs Morris has developed a line of Mor-Speed Production Machines.

Each machine is designed to handle a specific job and to obtain maximum production.

For example the Morris center column machine illustrated performs six operations—drilling—reaming—facing—spot facing—chamfering—and tapping simultaneously on automotive carburetor air horns. Thus producing a finished piece at every index of the fixture holding table.

Production is continuous as the twelve fixtures index automatically and operator unloads finished jobs and loads new piece at each index of the table.

If you are interested in high production and low costs consult Morris—they have the engineering experience and manufacturing "know-how" to design and build equipment to meet your specific job needs.

Write for complete details.

Builders of MOR-SPEED Lines

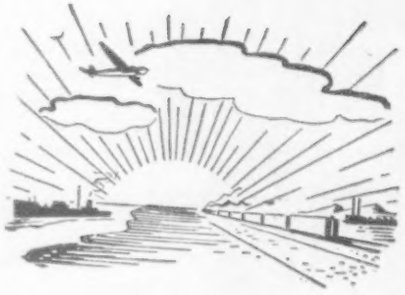
The MORRIS Machine Tool Co.

CINCINNATI 3, OHIO

West Coast

ROBERT T. REINHARDT

• Kaiser steel price cuts of from 9 to 34 pct sharply reflect softening of market and effects of competition . . . Buyers still complain prices not competitive.



SAN FRANCISCO—Final payoff on the longshot bet Henry J. Kaiser made last Aug. 15 when he boosted the price of steel at his Fontana plant approximately $30 a ton came earlier than even his severest critics predicted.

When the price boost was announced, Mr. Kaiser quite frankly stated that it was made because of his desire to reduce his financial obligations to the RFC before the end of the steel "sellers'" market. It was estimated at that time (THE IRON AGE, Sept. 16, 1948, p. 108) that Kaiser Co. Inc. would net approximately $10 million per year over and above profit accruing from previous prices and it was generally conceded that Mr. Kaiser's calculations were based on 2 to 3 years of steel scarcity.

When price reductions of from 9 pct to 34 pct, or from $10 to $39 per ton, were announced Mar. 22 which practically wiped out that $30 per ton increase, it was calculated that the 7 months' honeymoon with high prices had netted the Kaiser organization approximately $6 million. Collapse of the inflated price structure for Kaiser Steel was forecast by buyers (THE IRON AGE, Feb. 3, 1949, p. 140) but to many of them the price cut came even sooner than they had expected. It was known that there was considerable resistance to the prices of structural shapes and bars in particular and these were among the products slashed the most. Percentagewise the cuts were: structurals, 34 pct; hot-rolled sheets, 26.5 pct; carbon steel and reinforcing bars, 24.5 pct; cold-rolled strip, 21.8 pct; hot-rolled strip, 21.2 pct; plates, 8.6 pct.

The fact that plates were reduced the least is being interpreted in the trade as the result of the contract for 470,000 tons of steel plate which Kaiser Co. Inc. has with Transcontinental Gas Pipe Line Corp. for delivery by the end of 1950. There is little question but what Kaiser Co. can dispose of any and all plates produced at its Fontana plant, over and above the requirements of this contract, on the open market.

While company spokesmen have no comment, it is reasonable to believe that the price Transcontinental will pay for plate now under contract will not be affected by the latest price reduction. The prospectus of Transcontinental issued Dec. 2, 1948, has this to say about the price they will pay for the Kaiser plate:

"THE price to be paid under the contract amounts, in effect, to $113 per ton. The advance payments (including the initial payment of $3 million) are to be credited pro rata per ton against such price on deliveries after Dec. 31, 1949, if the minimum advances are paid or on all deliveries if the maximum advances are paid. Such price is to be adjusted for changes in the 'U. S. Steel quoted price' and in the 'differential in scrap prices' from those existing at the date of the contract.

"The 'U. S. Steel quoted price' is defined in the contract as the mill base price, plus all applicable extras, for steel plate of the same sizes and chemical specifications as the plate sold under the contract, quoted by U. S. Steel Corp. or its subsidiaries for delivery in the Chicago area. The 'differential in scrap prices' is defined as the differential between the highest price per gross ton for No. 1 heavy melting steel scrap in the Los Angeles area and such highest price for like scrap in the Chicago area, as published in the magazine 'IRON AGE' (at the date of the contract such Chicago price was $14.50 higher than the Los Angeles price).

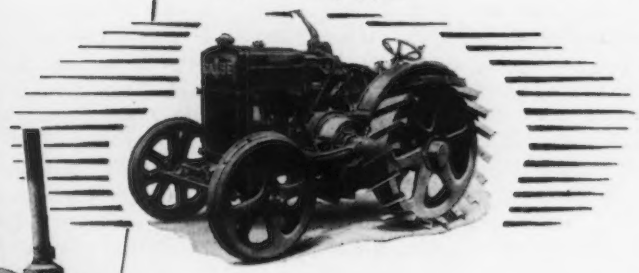
"The contract price is to be increased by the amount of any increase in the 'U. S. Steel quoted price' and by 32 pct of the amount of any decrease in the 'differential in scrap prices'; it is to be decreased by the amount of any decrease in the 'U. S. Steel quoted price' and by 32 pct of the amount of any increase in the 'differential in scrap prices.'"

Comparative West Coast Prices

	Kaiser Co. Inc. Previous Prices	Kaiser Co. Inc. Prices Announced Mar. 22, 1949		Columbia Steel Co. Current Prices		Bethlehem Pacific Coast Steel Corp. Current Prices	
	All f.o.b Fontana	All f.o.b. Fontana	*Delivered in Los Angeles	f.o.b Mill	*Delivered in Los Angeles	f.o.b. Mill	*Delivered to Long Beach Dock
Plate	$5.80	$5.30	$5.3824	$3.40 Geneva	$4.0213	$3.45 Sparrows Pt.	$4.33
Carbon Steel Shape	$5.75	$3.80	$3.8824	$3.25 Geneva	$3.8713	$3.30 Bethlehem, Pa.	$4.32
Structural Bars Carbon Steel Reinforcing	$5.30	$4.00	$4.0824	$4.05 Torrance	$4.0989	$4.10 Los Angeles (on cars)	
Sheets Hot-rolled	$5.65	$4.15	$4.2324	$3.95 Torrance	$3.9989	$3.25 Sparrows Pt.	$4.13
Strip Hot-rolled	$5.90	$4.65	$4.7324	$4.00 Torrance	$4.0489	$4.25 up to 4" wide Los Angeles (on cars)	
Strip Cold-rolled	$7.10	$5.55					

* Delivered prices are not quoted by mills, but are f.o.b. mill prices plus freight.

1921—Case Model A,
Twin Disc equipped

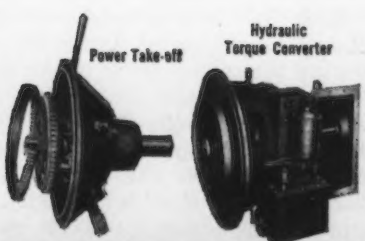


1949—Case Model DC,
Twin Disc equipped

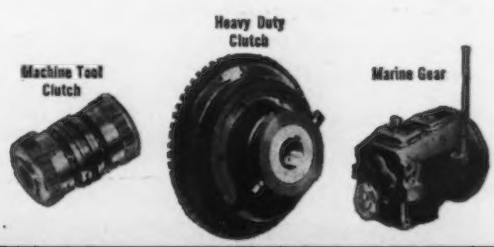
CASE history

The Twin Disc Clutch Company was incorporated in 1918 to meet the need for a superior clutch for use on farm tractors. One of the earliest users (1921) of these Clutches was the J. I. Case Company, long established manufacturer of farm equipment.

Today, as yesterday, J. I. Case Company uses Twin Disc Clutches in its farm machinery—adding up to 28 years constant usage of efficient Twin Disc power transmission units. Hundreds of other leading manufacturers of equipment . . . farm, logging, marine, petroleum, construction, machine tool, engine, and locomotive . . . also find Twin Disc Clutches and Hydraulic Drives efficient units for power transmission. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).



TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES



JUDGE TWIN DISC BY THE COMPANIES IT KEEPS

FROM the accompanying table it will be noted that in the Los Angeles area, constituting Kaiser Co.'s greatest market, its prices for plate, hot-rolled sheets and hot-rolled strip are still higner than competition. Only on carbon steel and reinforcing bars are Kaiser's prices low, although that company's prices for structural shapes approximates those of Columbia Steel Co. Columbia can still deliver plates and structural shapes from Geneva at lower cost than Kaiser and hot-rolled sheets and hot-rolled strip also cost the customer less when purchased from Columbia's Torrance plant. Bethlehem Pacific Steel Corp. can lay carbon steel plate down at the Long Beach dock for less than the f.o.b. Fontana price and the same holds true for hot-rolled sheets brought from Sparrows Point.

The price cut is even less encouraging to San Francisco steel users who figure that the only product they might get from Kaiser at a delivered cost below that from competitors are carbon steel and reinforcing bars. While not shown on the table, the freight rate from Fontana or Torrance is approximately 32¢ per 100 lb. With this amount added to Kaiser's newest f.o.b. prices, net cost to consumers in this area is higher on purchases made from Kaiser than from Columbia with the exception of the bars. Likewise plates and structurals shipped from Geneva, Utah, to San Francisco at freight cost of approximately 62¢ 100 lb can be laid down here for less than can the same products from Fontana.

Hot-rolled alloy bars were not affected by the latest reduction although these were dropped from $5.50 per 100 lb to $4.75 per 100 lb the latter part of February.

In the announcement of price reductions which became effective 12:01 a.m. Mar. 22 pipe prices were covered by this statement: "Galvanized pipe, consumer's carload basis, is now our card No. 7, dated Nov. 22, 1948, less 10 pct. Black pipe, our discounts are unchanged."

This price cut of the Kaiser Co. is additional evidence of a softening of the market in this area where gradual shifting has been evident for several months, although to a lesser degree than in the East. The so-called gray market is practically nonexistent and warehousemen are actually out ringing doorbells to dispose of most products. Last week in the Los Angeles area one large warehouse offered for sale at a discount several thousand steel sheets cut to odd sizes by the mill for an order placed by a manufacturer who suddenly was forced to cut back production.

Steel fabricators and other consumers are showing reluctance to build heavy inventories although there is no indication of a willingness to be caught short. As has been the case for the past 8 or 9 years, hot and cold-rolled sheet and wide flange beams are still tight in the West.

•

Ahead of Schedule

Fontana, Calif.

• • • **Construction of** the new 1200-ton blast furnace for the Kaiser steel mill here is well ahead of schedule and will be completed in the latter part of this year, engineers report.

With the seventh openhearth completed in the $35 million expansion program, work is going rapidly also on the new mill to roll steel sheets to a width of 78-in. and 14-gage, and on an electric weld pipe plant with a capacity of 100,000 tons of 5 to 14-in. pipe.

•

Natural Gas Hearings

Salt Lake City

• • • **This area** has been made utility-conscious by recent developments.

Mountain Fuel Supply Co., which distributes natural gas to Weber, Salt Lake City and part of Utah County, is seeking continuance of a temporary order permitting them to reject applications for new home heating connections. Reason is a demand which is growing much faster than the anticipated supply for the 1949-50 heating season.

At the hearings before the public service commission, various groups have been figuratively, and sometimes literally, screaming for a larger cut in the expected supply. Industrial users, who were cut off during the coldest parts of the past winter, want assurances of a firm supply. New home builders want conversion jobs prohibited so whatever is available can be put into homes which they hope to build and sell this summer. Present users are apprehensive as to what will happen to them unless the ban on new connections is continued.

o o o

WESTERN STEEL: *Here is part of U. S. Steel's $938 million post-war construction and modernization program. In the foreground is the new sheet and tin plate mill at the Pittsburg, Calif., plant of U. S. Steel's Columbia Steel Co. Equipped with modern machinery, the mill is producing cold-reduced sheets and tin plate for western industries.*

o o o

FASTER LOADING

Another COST-CUTTING Application of VICKERS Hydraulics

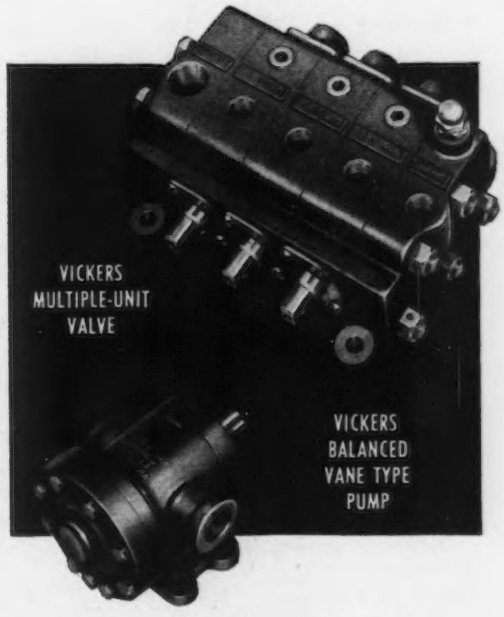
ATHEY Model 3 FORCE-FEED LOADER
SELF-PROPELLED

One important reason why users of the Athey Force-Feed Loader report savings in time and money is because it is equipped with Vickers Hydraulic Controls. A Vickers Multiple-Unit Valve is used to raise and lower the moldboard, throat, feeder and conveyor. Hydraulic power is supplied by a Vickers Balanced Vane Type Pump driven from the engine crankshaft pulley.

The Vickers Sectional Type Multiple-Unit Valve, available in many combinations for operating single- or double-acting cylinders, provides convenient and selective control. Ask for Bulletin 40-13.

Vickers Balanced Vane Pumps are outstanding for their long life and efficient operation. Their exclusive hydraulic balance construction entirely eliminates pressure-induced bearing loads and resulting wear. Longer life and less hydraulic slip are insured at maximum operating pressures. Ask for Bulletins 36-12 and 49-52.

3823



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DIVISION OF THE SPERRY CORPORATION

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Application Engineering Offices:

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LOS ANGELES • NEWARK • PHILADELPHIA • PITTSBURGH
ROCHESTER • ROCKFORD • ST. LOUIS • SEATTLE • TULSA
WASHINGTON • WORCESTER

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1920

PERSONALS

STEPHEN BIANCO, engineer of tests, Bethlehem Pacific Coast Steel Corp.

• **Stephen Bianco** has been appointed engineer of tests at the South San Francisco plant of Bethlehem Pacific Coast Steel Corp. succeeding Hubert C. Swett Mr. Bianco formerly served as metallurgical supervisor.

• **Robert A. Smith** has been promoted to the position of sales manager for the Hy-Pro Tool Co., New Bedford, Mass., a division of Continental Screw Co.

• **Richard A. Heald** has been elected president of the Heald Machine Co., Worcester, succeeding his brother, **Roger N. Heald,** who became chairman of the board of directors. Mr. Richard Heald had served as treasurer and Mr. Roger Heald had been president since 1931.

• **T. R. Bellmar,** who previously held the position of general traffic manager for the Northwestern Steel & Wire Co., Sterling, Ill., for a number of years before resigning in 1946, has been reappointed to that position.

• **George M. Dreher,** formerly superintendent of laboratories, Pittsburgh works, Jones & Laughlin Steel Corp., has been appointed chemical engineer. He had formerly been associated with United Alloy Steel Co. **J. M. Jeffries** has been made assistant to the manager of construction and maintenance and is in charge of all maintenance activities. Mr. Jeffries has been with J&L since 1928.

o o o

• **Robert W. Mullin** has been appointed district sales manager of the Pittsburgh district sales office, Pittsburgh Steel Co. **Alfred S. Gardner** has been appointed to succeed Mr. Mullin as assistant district sales manager in Pittsburgh.

• **Augustus H. Elliot,** vice-president of Southern Wheel Div., American Brake Shoe Co., New York, has retired after 40 years of service with the company. Mr. Elliot has served for nearly 18 years with Brake Shoe in various sales and engineering capacities in Philadelphia and New York. He became vice-president of Southern Wheel in 1927 and had charge of engineering and operations for many years.

• **John W. Hauser, G. Harold Hart, Joseph A. Hill** and **Jack B. Knight** have been named associates in the firm of J. O. Reinecke & Associates, Chicago. Messrs. Hauser, Hart and Hill had previously served the product design firm as industrial designers, while Mr. Knight had been business director.

• **John J. Hall** has been elected president of Richmond Radiator Co., Uniontown, Pa., an affiliate of Reynolds Metals Co. Mr. Hall had formerly been vice-president and general manager of sales. He has been associated with Richmond Radiator since 1944.

• **William C. Sleeman,** manager of the Bessemer, Ala., plant of Pullman-Standard Car Mfg. Co., has been appointed manager of the company's Chicago car works. Mr. Sleeman has been manager of the Bessemer plant since it was acquired from Tennesee Coal, Iron & Railroad Co. in 1929.

• **Arthur C. Heller** has been elected president of Heller Bros. Co., Newark, N. J., succeeding **Paul Heller,** who died. **James G. Henry, Jr.,** has been elected vice-president and secretary; **Lawrence B. Heller,** assistant secretary; **Anna W. Ibach,** treasurer.

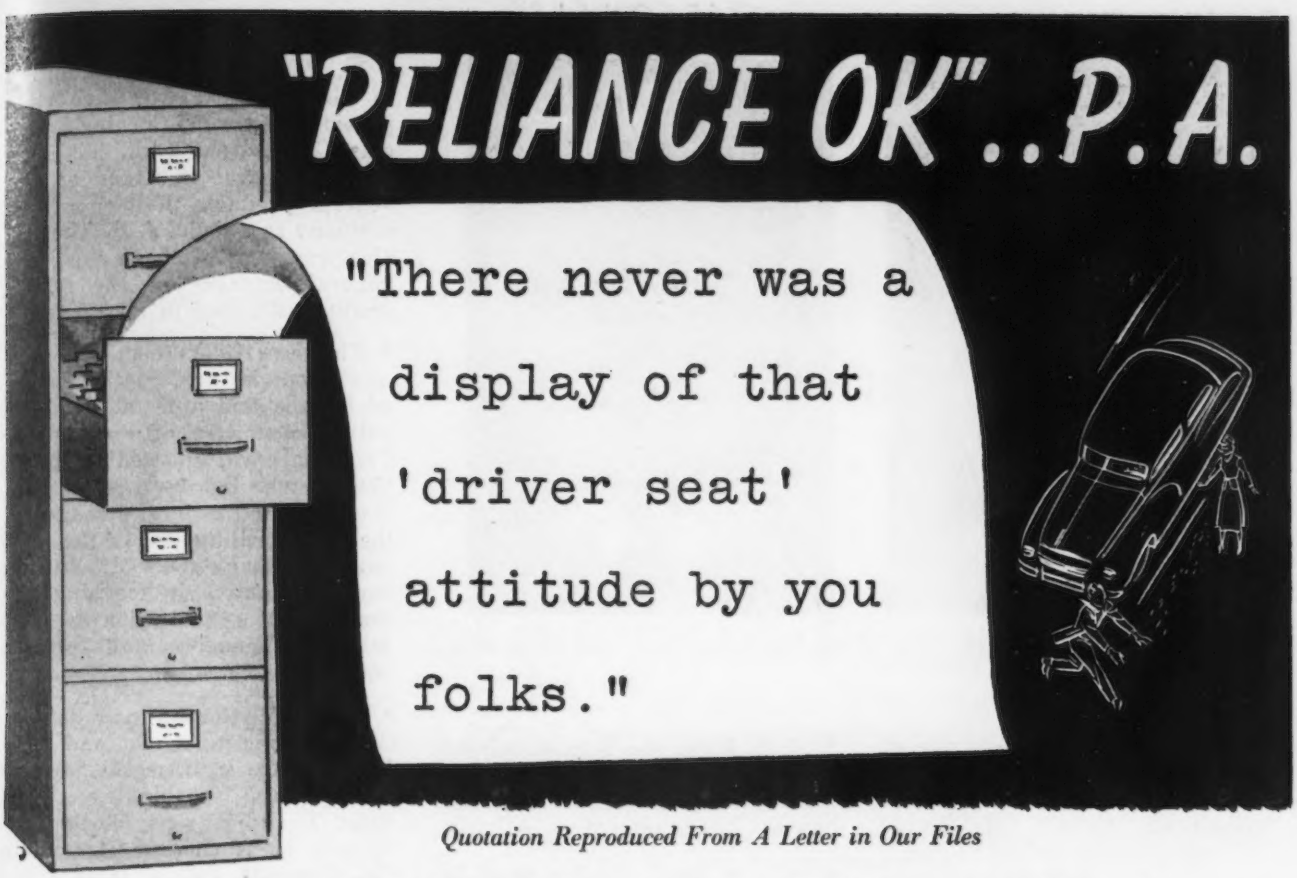
FRED ZIMMERMAN, vice-president and director of sales, Broderick & Bascom Rope Co.

• **Fred Zimmerman,** vice-president in charge of sales, assumes the new title of director of sales, Broderick & Bascom Rope Co., St. Louis. **J. J. Sieber** has been appointed sales manager. Mr. Zimmerman joined the organization in 1911.

• **Robert B. Coppage** has been named stud welding specialist for the Big Three Welding & Equipment Co. in the Fort Worth-Dallas, Texas, territory. **Jack W. Harris** has been named in the same capacity for the Oklahoma Oxygen Co., Tulsa, Okla., a distributor of Big Three products. Both Big Three and Oklahoma Oxygen are exclusive distributors, in the southwest and in Oklahoma, respectively, for the Nelson Stud Welding Div., Morton-Gregory Corp., Lorain, Ohio. Mr. Coppage has served Nelson as sales engineer in Cleveland, St. Louis and Chicago, prior to joining the Big Three organization at Fort Worth. Mr. Harris served Nelson as service engineer in New York, Washington and Philadelphia, prior to joining the Oklahoma firm.

• **Thomas W. Wright** has been appointed to the New York sales staff of the Babcock & Wilcox Tube Co., Beaver Falls, Pa. Mr. Wright had formerly served on the company's metallurgical staff.

• **W. R. Tucker** has been elected a director of Hydraulic Press Mfg. Co., Mt. Gilead, Ohio, succeeding his father, **W. G. Tucker.**



Quotation Reproduced From A Letter in Our Files

Steel Plentiful or Scarce . . Reliance Service Clicks with Sheet and Strip Steel Buyers

DEPENDABLE DAN
OUR CUSTOMERS' MAN

Here is Reliance Service in action from the P. A's angle . . . in his own words.

"We feel we have been given a fair share of materials . . ." "Your steel is preferred by the men in our shop" . . . "Your service far above the average warehouse in this area" . . . "Your timely assistance kept our plants operating" . . . "You have been doing everything possible under present conditions" . . . "In a pinch we can depend on Reliance coming through" . . . "You have gone all-out" . . . "You helped us out of a bad situation." . . . etc. . . . etc.

Reliance is constantly planning and working toward greater production and supply . . . towards higher standards of steel service.

DETROIT STEEL CORPORATION

PRODUCERS OF
COLD ROLLED STRIP STEEL

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PROCESSORS AND DISTRIBUTORS JOB-FITTED SHEET AND STRIP STEEL

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Plants: Chicago, Cleveland, Detroit, New Haven
Sales Offices: Grand Rapids, Indianapolis, Lansing, Mich. New York, St. Louis, Toledo, Worcester

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Products: COLD ROLLED STRIP STEEL—Coils and Cut Lengths . . . Slit or Round Edges . . . All Tempers . . . HOT ROLLED PICKLED STRIP STEEL—Cut Lengths . . . SHEETS—Hot Rolled . . . Hot Rolled Pickled . . . Cold Rolled . . . Long Terne . . . Galvanized.

H. F. WARDWELL (left), chairman of the board, and W. C. OWEN (right), president, Detroit Steel Products Co.

• **H. F. Wardwell** has been named chairman of the board and **W. C. Owen,** president, Detroit Steel Products Co., Detroit. Mr. Wardwell had formerly served as president and Mr. Owen as executive vice-president. **William Gillett** and **E. C. Hodges** have been elected vice-presidents.

• **Byron J. Korb,** market research analyst, has joined the general sales organization of Koppers Co., Inc., Pittsburgh. He is the former manager of market research for Johns-Manville Sales Corp.

• **R. M. Bartlett,** formerly vice-president in charge of fuel oil sales, has been named vice-president in charge of general sales, Gulf Oil Corp., Pittsburgh. **H. P. Hobart,** formerly vice-president in charge of lubricating oil sales, has been appointed vice-president in charge of product development and product engineering. **H. G. Meador** formerly division manager at New Orleans, has been elected a vice-president.

• **Paul C. Cost,** director of sales of Industrial Appraisal Co., Pittsburgh, has been elected vice-president of the company.

• **Frank R. Denton** has been elected a director of Diamond Alkali Co., Pittsburgh. **John Berdan** and **John A. Sargent,** have also been named to the board.

• **W. S. Huss** has been appointed sales manager, Southern Div., Acme Steel Co., Chicago. Mr. Huss has his headquarters in Atlanta.

• **Vern R. Drum, John F. Wallace** and **E. W. Cleveland** have been named vice-presidents of the Cleveland Pneumatic Tool Co., Cleveland. **Ogden Ashley** has been appointed treasurer, **Lloyd R. Shivley,** controller, and **Melvin J. Balser,** assistant controller. **Ray E. Greenough** has been appointed chief engineer.

• **J. Clarence Kimpel,** formerly secretary and treasurer of C. M. Kemp Mfg. Co., Baltimore, has been elected president and chairman of the board, succeeding Wallace W. Kemp, who died. **Edward J. Funk, Jr.,** has been named vice-president. Mr. Funk also continues in his present capacity as chief engineer. **Charles E. Wilbur,** formerly assistant secretary and treasurer, has been elected secretary and treasurer and **Wilfred G. Keir** has been added to the board of directors.

• **Dr. Eugene L. Woroch** has joined the staff of Bjorksten Research Laboratories. Dr. Woroch was previously connected with the Wisconsin Alumni Research Foundation. **James E. Henning** has also joined the staff of Bjorksten as a research chemist. Mr. Henning was previously connected with the Kester Solder Co., Chicago.

• **W. P. Zimmerman,** in addition to his duties as executive vice-president of Owens-Corning Fiberglas Corp., New York, has been named general manager of the general products division of the company in Toledo. **J. H. Thomas,** vice-president, has been appointed general manager of the textile products division in New York.

• **Theodore O. Yntema** has been appointed vice-president in charge of finance and a member of the policy committee of Ford Motor Co., Dearborn, succeeding **L. D. Crusoe,** who has been made vice-president and general manager of the new Ford division of the company. For many years Mr. Yntema has been active in teaching, research and consultation to government agencies and private corporations.

• **Robert M. Gordon,** president of Gordon Lubricating Co. and **John R. Ponsetto,** of Ponsetto Sales & Service, and president of Penn Scott Foundry, were elected directors of American Cladmetals Co., Carnegie, Pa.

• **John D. Schneider** has been appointed advertising manager of the National Screw & Mfg. Co., Cleveland. Mr. Schneider's duties include advertising and publicity for the parent company and subsidiaries, including Chester Hoist division, National Screw & Mfg. Co., of Calif., and Hodell Chain Co.

JOHN D. SCHNEIDER, advertising manager, National Screw & Mfg. Co.

• **Frank S. Best** has been appointed quality control engineer of Cordley & Hayes, New York. Mr. Best has been prominent in the refrigeration industry for the past 25 years. He comes to Cordley & Hayes from International Standard Electric Corp.

• **William Smiley,** formerly sales manager for Ducommun Metals & Supply Co.; **Robert C. Brinkley,** formerly with Steel Service & Supply Co., and **James E. Callahan,** have been appointed sales representatives for the Ziegler Steel Service Co., Los Angeles.

• **George S. Berry** has been appointed district sales manager for the Philadelphia sales district, Pittsburgh Steel Co., Pittsburgh. He became associated with the company in 1943 and has held positions in the Pittsburgh and Philadelphia district sales offices.

• **Edward Ladd** has been named manager of the sales engineering department of the aviation division, United Aircraft Products Inc., New York.

• **Norman F. Tisdale,** chief metallurgical engineer of the Molybdenum Corp. of America, Pittsburgh, has been made manager of sales. Mr. Tisdale is well-known in the steel and iron industry and is active in various technical societies.

NORMAN F. TISDALE, manager of sales, Molybdenum Corp. of America.

WALLACE H. HITCHCOCK (left), division manager, and CHARLES J. PAUMIER (right), works manager, Revere Copper & Brass, Inc.

• **James R. Berkey** has been appointed Omaha district representative for the Auto-Lite Battery Corp., Toledo. He had formerly been associated with the Standard Oil Co. in Des Moines.

• **Walter V. Davidson, Jr.** has been named assistant to the president, W. B. Connor Engineering Corp., New York.

• **F. H. Appenrodt,** who served many years as office manager of the Pittsburgh district sales office of the Carborundum Co., has resigned and has been succeeded by **H. P. Erbe. R. L. Heimstadt,** assistant office manager of the Detroit district sales office has been promoted to office manager of the Cleveland district sales office succeeding Mr. Erbe. **D. S. Masson,** manager, sales administration, home office, has been promoted to the position of assistant to the district sales manager in Detroit.

• **M. W. Sledge** has been appointed assistant manager of the belting sales department of Goodyear Tire & Rubber Co., Akron, Ohio, replacing **W. P. Hallstein,** who died. Mr. Sledge joined the company in 1935 as a member of the production squadron in Akron. Previous to his new appointment he had served as mechanical goods field representative in Knoxville, Tenn., with headquarters in Atlanta.

• **Wallace H. Hitchcock** has been made division manager of the recently established Pacific Coast Div., Revere Copper & Brass Inc., in Los Angeles. **Charles J. Paumier** has been named works manager there.

• **B. R. Teree** has been appointed director of engineering, hydraulic division, New York Air Brake Co., Watertown.

• **William F. Huck** has been appointed consulting engineer, the Electric Boat Co., New London, Conn.

• **Edward Wagner,** president of W. T. Wagner's Sons Co., Cincinnati, has been elected a director of General Box Co., Chicago. **Francis J. McGraw, T. W. Regan, H. B. O'Donnell** and **George T. Walne** have been elected vice-presidents of General Box. Mr. McGraw, who joined the company 22 years ago, had previously served as district manager in charge of the East St. Louis, Ill. plant. Mr. Regan had previously been district manager in charge of the Winchendon plant and the New England sales area of the company. Mr. O'Donnell joined the company in 1928 and has served as manager of the Brooklyn plant and as eastern sales manager since 1945. Mr. Walne joined the company in 1926 and since 1946 has been manager of the Chicago sales area.

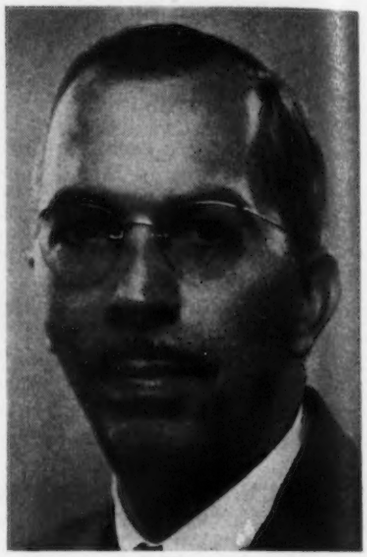
STANLEY S. WILLIS, district manager, Brass Div., Korotest Mfg. Co.

• **Stanley S. Willis** has been appointed Chicago district manager of the brass division of Kerotest Mfg. Co., Pittsburgh. Mr. Willis has been associated with Kerotest since 1931 and for the past 10 years has been production planning manager over all operations.

• **A. J. Crouch, P. M. Saxman, W. H. Murphy, E. F. Manning** and **E. V Hall** have been added to the staff of field service engineers of the metal industries department of the Diversey Corp., Chicago.

• **Walter F. Spoerl,** formerly general sales manager of the mechanical goods division of the U.S. Rubber Co., New York, has been made general sales manager of the mechanical goods, general products, Lastex yarn and rubber thread divisions of the company. **Robert D. Gartrell,** development manager for the company's Passaic, N. J., plant, has been named development manager for all divisions. **Wesley A. Armstrong,** factory manager of the company's Bristol, R. I., plant, has been appointed production manager. **Frederick S. Bartlett** has been named factory manager of the Bristol, R. I., plant.

• **Ray Sellens** has been appointed sales manager of residential products in the building products division of Reynolds Metals Co., Louisville. Mr. Sellens joined Reynolds in 1947 in Texas. Prior to his transfer to the Louisville office he served as special representative in the company's eastern division.



RICHARD S. MOORE, sales manager, basic refractories, Harbison-Walker Refractories Co.

• **Richard S. Moore** has been appointed manager of basic refractories sales, Harbison-Walker Refractories Co., Pittsburgh. Mr. Moore joined Harbison-Walker in 1928 and in 1940 was named head of the basic sales department where he specialized in insulating refractories.

OBITUARY...

• **Cleveland Norcross,** 37, general manager, American Institute of Physics, died March 21.

• **John M. Jerpe,** 58, director of the suggestion plan organization for General Motors, Detroit, died recently.

• **Myer D. Maremont,** 77, chairman of the board of directors of Maremont Automotive Products, Inc., Chicago, died March 8.

• **Lawrence H. Lund,** 51, vice-president and treasurer, Westinghouse Electric Corp., Pittsburgh, died March 14.

• **Raymond E. Hall,** 52, general superintendent of overall operations, Kellogg Mfg. Co., Rochester, a division of American Brake Shoe Co., died recently.

• **Richard L. Tappenden,** 76, formerly superintendent of the Cleveland City Forge Co., Cleveland, manager of Joseph Dyson & Sons forging plant and founder of Tappenden & Andrus, metal manufacturers' agents, died March 15.

• **C. E. Christensen,** 54, vice-president and treasurer, Independent Sheet Metal Corp., Seattle, died March 11.

• **William Crane,** 83, president and treasurer, Crane Co., died March 13 in Newton Center, Mass.

• **Percy W. Fenner,** 67, long identified with the tool steel industry, died March 16, in Cleveland.

• **Leland G. Harwood,** secretary, Taylor & Fenn Co., Hartford, died March 14.

• **Carl P. Riegger,** 74, general purchasing agent, Grinnell Corp., Providence, died Feb. 19.

• **Paul J. Houck,** 50, purchasing agent, Pratt & Letchworth Co., Inc., Buffalo, died March 19.

• **George E. Merry,** 85, retired, of the tin and armor plate firm of metals brokers, E. J. McVoy, Chicago, died March 20.

• **John R. Whaley,** 75, retired purchasing agent, Otis Elevator Co., New York, died March 15.

• **David R. Wilson,** 74, automobile industry pioneer and co-founder of one of the largest iron foundries, died March 11 in Pontiac, Mich.

• **Eric P. Dahlstrom,** 51, chief mechanical engineer of the Midwest Abrasives Co., died March 8.

• **Roy R. Summerville,** 48, assistant director of operations at Birmingham for Southern States Iron Roofing Co., died March 7.

"FLEETWELDERS" ELIMINATE ARC BLOW ...increase welding speed 10%

By J. K. GANNETT
Vice President in charge of Engineering and Research,
The Austin Company,
Cleveland, Ohio

J. K. Gannett

The solid, uniform welds required in our heavy structural work are now being made easier and at lower cost with AC arc welding. By eliminating the restrictions of arc blow in the construction of heavy structural weldments like the roof truss shown, our fabricating shop is today able to take full advantage of higher welding currents with resulting substantial increases in welding speeds.

Structural members like the jack truss shown in the photographs are shop fabricated from wide flange beams and from plate. Component members are first positioned accurately for close fit-up and tack welded. One side is then partially welded with fillets of ¼" "Fleetweld 7" electrode using 500-amp. Lincoln "Fleetwelder" AC arc welders.

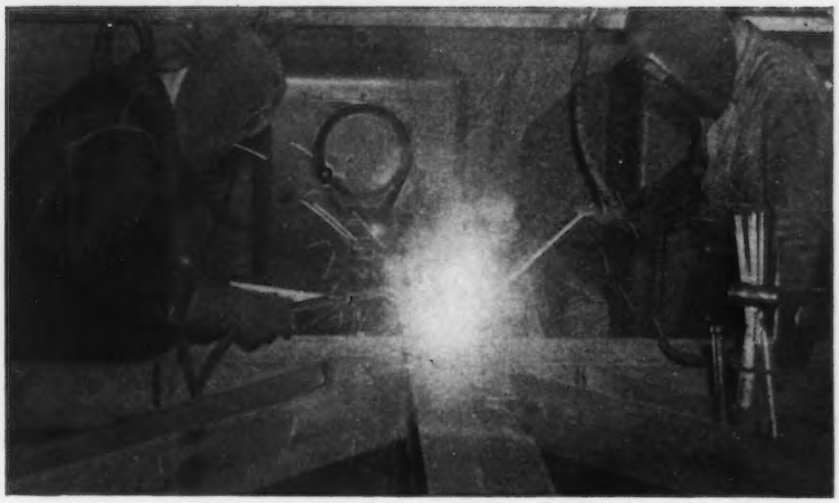


Fig. 1. ***Arc** welding diagonals to chord with the 500-amp. Lincoln "Fleetwelder" AC welders at the structural fabrication shop of The Austin Company.*

After the initial side welds are made, the truss is placed in an upright position as shown in Fig. 2 and continuous welds completed around each member, framing into the lower chord. The truss is then flopped over and similar welding is done for the members framing into the other chord. This procedure permits us to use fast downhand welding techniques on all connections and assures us solid, high quality welds on all joints at the lowest fabricating cost.

Using the AC "Fleetwelders," thus eliminating arc blow, allows our operators to increase their current to over 300 amperes with no difficulty in maintaining a steady, constant arc at all times. Increased amperage, combined with steady, uninterrupted operation, has cut our welding time about 10%.

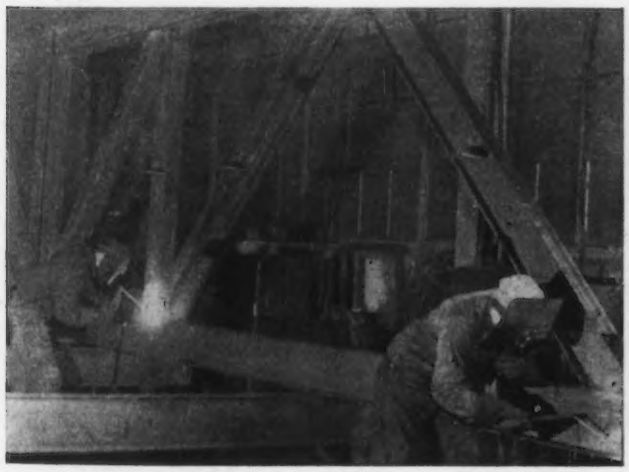


Fig. 2. *Fabricating all-welded 40-ft. jack truss for factory building framework. Top and bottom chords are 10"-21WF beams; diagonals are 8"-17WF beams. Welds are downhand, single pass, ⅜" fillets.*

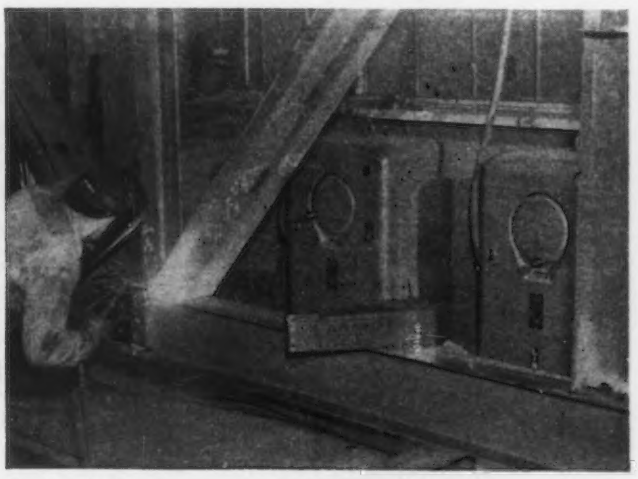
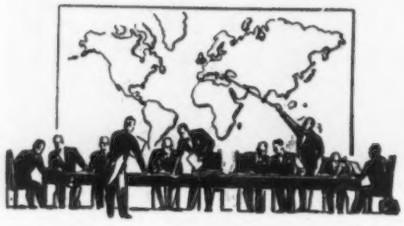


Fig. 3. *Finishing all-around welding of diagonal to bottom chord. Weld is made with single pass ¼" diameter "Fleetweld 7" electrode. Welding current is 310 amps.*

The above is published by **THE LINCOLN ELECTRIC COMPANY** *in the interests of progress.*
For further information on "Fleetwelders," write for Bul. 366. The Lincoln Electric Company, Dept. 54 Cleveland 1, Ohio.

European Letter . . .

• Recent loss of some foreign markets to Belgium creates problem . . . Difficulties should be judged without political bias . . . Rigid economic nationalism does not provide key to Belgian economic expansion.



LONDON—One of the most unfortunate features of postwar recovery has been the inability of trade to keep pace with the expansion of production. In general terms, world production is not far short of its prewar level. Trade on the other hand stands at only 75 pct of the prewar figure. And this fact creates special difficulties for the Marshall Plan countries, since their livelihood depends upon trade.

The case of Belgium is typical. The Belgians depend upon foreign trade to an even greater extent than the British. The Belgian national income is largely derived from the processing and resale of imported materials. After three phenomenally successful years, Belgium began, in the course of 1948, to lose a number of foreign markets. The demand for primary products—copper, zinc, pig iron and steel—was maintained, but the export market for processed or manufactured goods like cars, cycles and textiles deteriorated. It was above all this contraction of exports which brought about the most discussed feature of the Belgian economy—the emergence and then the growth of unemployment. After three years of full employment, the figure of totally and partially unemployed rose from an average of about 150,000 in 1948 to close on 300,000 at the turn of the year. Since January, the numbers have declined again and the total unemployed is about 230,000, or some 9 pct of the insured population.

Such a scale of unemployment offers a challenge both politically and economically to the Belgian regime. Politically, M. Spaak's coalition of Catholics and Socialists has been able to overcome divergent views on free enterprise and planning, largely through the demonstration of successful working of free enterprise in Belgium. Yet growing unemployment has caused an undercurrent of *malaise* since it appeared some months ago, and recently it has once again led to talk of a split between the two parties. The immediate issue was the increased payment of unemployment benefit. Under the 1949 budget, the allocation for unemployment benefit—880 million francs—was based on a figure of only 106,000 unemployed. In order to meet the much larger actual figure of unemployment with a more adequate benefit an increase of three billion francs has been agreed. But so far agreement has not been reached on the methods of raising the extra funds. The Socialists have proposed a tax on company profits which the Catholics reject. Political events, such as the signing of the Atlantic Pact, make an immediate split unlikely, but the underlying crisis remains.

Reprinted from the London Economist by special permission.—Ed.

THE Belgian Socialists are not concerned with unemployment alone. They are uneasy over the general economic liberalism of the Belgian regime. They complain that policy has been made at the Bank of Belgium with a too exclusive emphasis on monetary policy and techniques. They blame part of the present unemployment upon the very tight control over credit that has been exercised in the last year. Inflation has been staved off, it is true, and the Belgian franc is the hardest and most stable currency in Europe. But, the critics ask, is this policy right in a time of threatened recession? Part of the unemployment is to be found among building workers and general constructional laborers. Yet cheap housing is needed and Bailey bridges still serve some of Belgium's major highways. There is therefore need and scope for an expansion of public works. The counterargument that such an expansion would again promote inflation does not convince the Socialist critics. It could be financed, they maintain, out of increased taxation without checking the initiative and will to produce of the Belgian entrepreneur. Out of a national income of about 220 billion francs, 58½ billion was raised in taxation in 1948, but indirect taxation accounted for almost twice as much as the income tax. The Socialists' proposal, that additional money for unemployment relief should be raised by taxing profits, is only part of their growing belief that the distribution of the benefits of the free economy in Belgium is uneven and unjust.

There are, however, some more particular economic grounds for misgivings about the trend of Belgian budgetary policy. Before the war, governments tended by their financial policies to increase economic instability, to accentuate the tendency towards depression once its symptoms appeared and to add fuel to boom conditions in times of expansion. The policy associated with the name of Lord Keynes, whereby on the contrary governments should increase taxation and build up surpluses in good times, while practising credit expansion and deficit financing in times of stringency, has not yet been put fully into operation by any community. The Belgians can, there-

JANE RUSSELL Starring In R K O's "IT'S ONLY MONEY"

This is more than just a Pretty Picture

OF COURSE . . . Jane Russell on her new Indian motorcycle is mighty attractive, *But* . . .

If you're a motorcycle enthusiast, you'll look further and see more. You'll find that the new Indian models are different—less than half the weight of former motorcycles—yet they deliver more horsepower per pound than any stock machine previously marketed.

Why? Some of the answers are illustrated at the right. To attain maximum *durability* and to build a *high-powered, light weight* and *safe* machine, engineers of the Indian Motocycle Company, Springfield 4, Mass., specified nickel alloy steels and irons for vital parts, including those pictured.

Centrifugally cast cylinder liners of nickel iron.
Transmission gears of 3115 type Ni-Cr steel
Indian crankshaft of 3140 Ni.Cr steel
3140 Ni-Cr steel connecting rods
EMBLEM OF INCO SERVICE
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fore, hardly be criticized for not making the attempt. But their present policy is the exact antithesis of the notion of using budgetary policy as an instrument of equilibrium. In the booming year of 1947, taxation was low and there was a budget deficit of over 14 billion francs. For 1949, the forecasts are an increase in taxation of 14 billion over 1947, and a small budgetary surplus (of 290 million francs). The danger that financial policy may be mistimed and may accentuate the trend towards recession is clear.

The emergence of unemployment in Belgium has unfortunately been regarded with some *Schadenfreude* in certain circles in Britain. The marked success of Belgium's postwar policy of prosperity, abundance and free enterprise has seemed a reproach to the policy of austerity pursued in this country; and it is likely that if Belgium's difficulties grow worse, the result will be proclaimed as one more proof that the free economy must give way to the socialist state. It is therefore vital to judge the Belgian problem without political bias and, in particular, to make an unprejudiced analysis of the reasons why it has come about. Insofar as the number of unemployed in Belgium could be reduced by more ambitious public works and better housing, the result would be all to the good, economically and socially. When, however, critics in this country go further and seek to blame the whole of Belgium's problem of unemployment on free enterprise and free consumer's choice, they miss the real point of the present difficulties.

THE criticism generally takes two forms. The first is that Belgium, by using its dollars to import inessential goods, has upset the whole dollar balance of western Europe, and by its refusal to modify its policy is jeopardizing stability after 1952. The second is that, because Belgium insists on payment in gold and hard currencies after it has accumulated a maximum balance of other countries' currencies, its action restricts trade and contributes to the deflationary pressures in western Europe. Neither charge is now entirely just. In the last year, Belgium's dollar policy has been modified. Purchases from the United States have been reduced from 22,662 million francs to 14,257 millions. Exports have been expanded from 2,711 million francs to 3,951 millions. The result has been a reduction in the adverse dollar balance of over 9 billion francs in one year. These are important economies, brought about in part by specific government action in stricter import licensing. The Belgians can fairly claim that they are making a contribution to cutting down Europe's dollar deficit.

The second criticism, that Belgian trade practice unnecessarily restricts intra-European trade, goes to the root both of the Belgian and the European problem: of the Belgian because the bulk of unemployment is in the export industries, of the European because all the Marshall countries depend more or less upon their foreign trade. The Belgians can reasonably resent the criticism because in the first place they, as western Europe's creditors, have made considerable concessions under the "little Marshall aid" plan of intra-European payments, making $207.5 million available out of a total allotment to Belgium of only $247.9 million.

In addition the Belgians have undertaken under the new Benelux agreement to make further credits available to the Dutch. There may be some dispute about the exact amount of credits which Belgium can reasonably grant and at what point such extensions would precipitate inflation inside Belgium; But it is certainly wrong to present Belgian trading policy as entirely restrictive and gold-bound.

THE real difficulty is that, however generous Belgian credits might be, the Belgians alone could not solve the problem presented by the shrinking of Europe's export markets. On the contrary, the failure of trade to expand quickly enough is now threatening prosperity inside Belgium itself, and the lesson which the present level of unemployment in Belgium carries for its neighbors is that the trading nations of western Europe acting separately cannot solve their economic problem. At present, the danger facing Europe is a drift back towards the depressed conditions of the early 'thirties. In those days, the separate action of nineteen separate little trading areas did not lead to a genuine recovery from the 1929 depression. It was the era when bilateral trading and autarchy began to take the precedence they still seem to enjoy in Europe today. Yet in the 'thirties the conditions favoring multilateral trade were infinitely more promising than they are today.

When, therefore, British critics of Belgian policy point to the way of austerity and rigid bilateral trading as the solution of Belgium's difficulties, they entirely miss the point of the Belgian dilemma and fail to see that within a year it may be their own. No isolated Belgian action can recreate the export market, any more than can separate efforts on the part of the Italians or the Germans or even the British. Acting separately, they must reproduce a worse version of the nineteen thirties when—as now—rigid economic nationalism failed to provide the key to the expanding economy. What is needed, indeed, is a really heroic effort on the part of all the nineteen—and their American colleagues—to work out and provide the conditions under which markets can genuinely recover and trade be expanded. The Belgians, with their efforts to do away with tariff barriers within Benelux, can claim that they are making some contribution to original thought and action in this matter; but Benelux, like Belgium itself, is not large enough to be decisive. Meanwhile western Europe may not have much time left to meet the present danger of contracting markets and to avert in the 'fifties a repetition of the depressed conditions of twenty years ago.

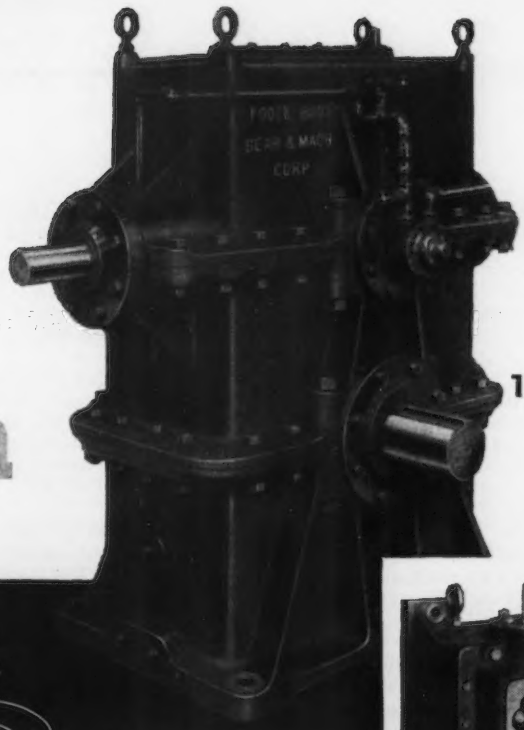
Named Mexican Manager

Chicago

• • • **Walter J. Armstrong** has been named manager of Mexican Operations for the International Div. of Armour Research Foundation of Illinois Institute of Technology, as announced recently by Dr. Francis W. Godwin, division director, in Mexico City.

Dr. Godwin said Armstrong's appointment to the newly-created post was brought about by the Foundation's growth in Mexico and by numerous requests for assistance in other parts of the world. The Foundation has been engaged in continually expanding programs of research and development in several Central and South American countries since 1941.

need a drive like these



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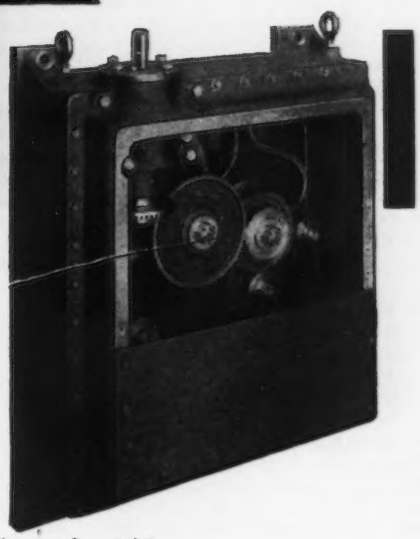

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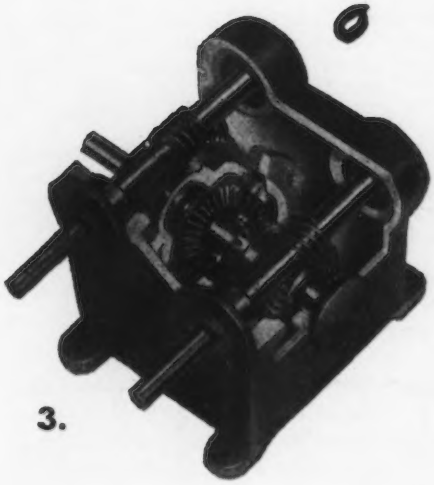

3.

One of the services Foote Bros. renders industry is the production of drives such as these shown here to meet individual needs.

1. Here is a giant gear reduction unit engineered to stand the pounding, crushing force necessary in the production of asphalt tile.
2. Here is a textile mill drive that not only provides a number of shaft speeds, but also permits gear ratios to be changed quickly.
3. Here is a small, compact unit that permits a quick change from forward to reverse on a predetermined time cycle.

If you are now using special drives on the equipment you manufacture, be sure to investigate the facilities of Foote Bros.' large plants completely equipped to produce gears and drives to meet practically any need.

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ENCLOSED GEAR DRIVES FOR ANY INDUSTRIAL USE

• **GETTING INTO LINE**—Pittsburgh Steel Co. reduced prices on nails and other wire products on Mar. 22, bringing its quotations into line with those of competitive producers. The company, which had been charging premium prices, is currently operating at a high level and has a substantial order backlog. It is understood that study of the overall supply-demand picture led to the reductions, which average 9 pct.

• **DUTY-FREE COPPER**—Copper may be imported duty free for another year, under provisions of a bill which became law this week. The suspension of import duties on copper has been in effect since World War II. Munitions Board officials say they are continuing to stockpile copper at the rate of 15,000 tons per month.

• **ENLARGING**—At Mansfield, Ohio, Empire Steel Co. will take an openhearth out of production about Apr. 10, for rebuilding and enlarging to a 130-ton furnace. Present capacity of the furnace is 90 tons. It will be out of production until May 1, or thereabouts. A company spokesman said Empire's other five furnaces will continue in operation.

• **TREND?**—Within the last few weeks eastern producers of plates, shapes, sheets, and bars have again started to ship into the Midwest. Tonnages are not large, with the exception of one plate offer, but consumers are being offered larger tonnages than when the move first started. As far as can be determined the producers are not absorbing freight.

• **EMPLOYMENT TO RISE**—There will be a moderate employment recovery in late April and May but it will not take up the slack in unemployment when compared with last year's high level, according to the Federal Security Agency.

• **FURNACES DOWN**—Copperweld Steel Co. is operating at about 40 pct of capacity at Warren, Ohio. Three furnaces are in operation, and four are down. Drop in operations is attributed to decline in demand for conversion tonnages by company spokesmen.

• **PIPE DOWN**—National Tube Co. has increased base discounts on galvanized pipe by 1½ points. This amounts to a decrease of $3 per ton. The action followed the decrease of 1½¢ per lb or $30 per ton in the price of zinc.

• **CUT EXTRAS**—Following the 1½¢ per lb reduction in the price of zinc Carnegie-Illinois Steel Corp. has revised coating extras for all its galvanized sheet products. The reductions range from 80¢ to $5 per ton, depending on the gages involved. Republic Steel Corp. also reduced galvanized sheet up to $5 a ton because of the decrease in the price of zinc.

• **RAILROAD BUYING**—Carryover into 1949 of unexpended authorizations for new equipment includes orders for 90,000 freight cars, 2000 passenger cars, and 1633 new locomotives, according to the Assn. of American Railroads. Estimated cost of these items is $855 million. Expenditures in 1948 were listed as more than $917 million.

• **OFFERS**—Pricewise the gray market has been forced down to about the warehouse price level in the Midwest. But the steel tonnage offered by the Johnny-Come-Lately's in the industry is substantial. A Detroit firm reports as many as 50 offers a week to buy odd lots of steel from little known sources.

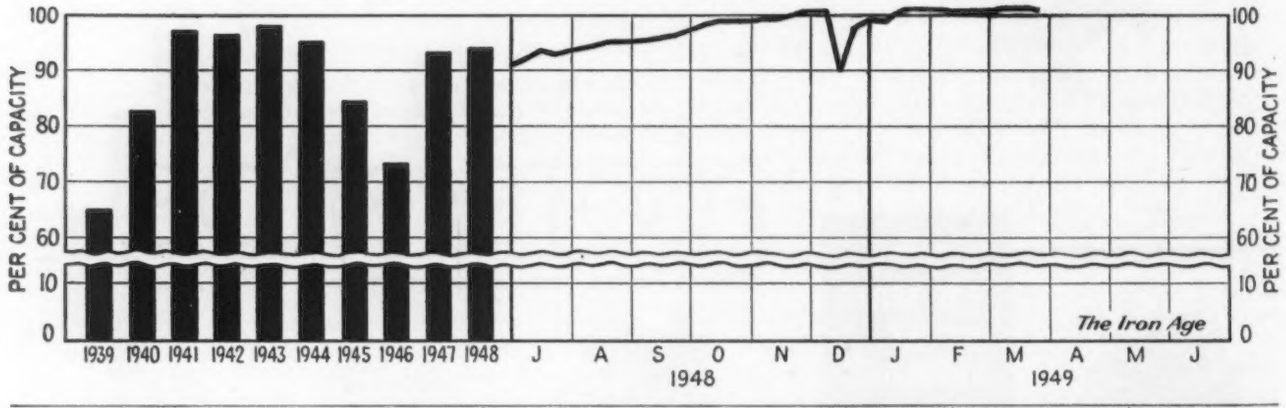
• **RETURN**—The almost forgotten art of steel salesmanship is rapidly coming back. A Springfield, Ohio, firm reports seeing the first steel salesman since 1942. In the Toledo area, hot-rolled products are being offered by firms who have been out of this territory for months.

• **CONTRACT**—The Westinghouse Electric International Co. has entered into an agreement with the government of the East Punjab province in India for the design and equipment of a 110,000-kva hydro-electric power project on the Sutlej River. Equipment for the project will cost approximately $9 million. Negotiations for the project have been under way since 1945.

• **EXPORTS DECLINE**—Exports of United States goods and services were $6.3 billion greater than imports in 1948, according to Commerce Dept. tabulations. Excess of exports over imports in 1947 was $11.2 billion. Last year's totals were $16.8 billion for exports, $10.5 billion for imports.

• **PIPE LINE**—Application has been made to the Federal Power Commission by Kansas-Nebraska Natural Gas Co., Inc., for permission to construct 210 miles of main, lateral and loop line to provide service to 13 additional Nebraska towns and expand present service.

Steel Ingot Production by Districts and Per Cent of Capacity



Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
March 22.....	103.5*	101.5*	95.5*	100.0	108.0*	105.0	102.0	95.0	109.0*	100.5	110.0	82.5	112.5	102.0
March 29.....	101.0	100.5	95.0	99.0	107.0	105.0	102.0	94.0	104.5	102.0	110.0	82.5	105.5	100.5

* Revised.

Industrial News Summary

- ***Scrap Prices In Wide Break***
- ***Composite Down $3.75 a Ton***
- ***Buyers' Market Coming Soon***

THE IRON AGE composite price of heavy melting scrap is down $3.75 a gross ton this week—one of the sharpest drops in the present downward movement. It now stands at $31.17 a gross ton, lowest since June, 1947. Since the first of this year the composite price of prime scrap has plummeted $11.83 a gross ton.

This weakness can no longer be laughed off. It means that despite the high level of steel output no important consumer of scrap has been willing to step in and buy a substantial tonnage of heavy melting steel. Nor is any such support in view this week.

All steel companies with but few exceptions have been and are this week still paring down the supply of higher priced scrap on hand. It appears this week that this depletion of scrap inventories by the mills has not yet run its course. It may go on for another 30 days. Regardless of what the long term outlook for scrap is, the tendency is to stay out of the market.

For the past several weeks scrap markets have been so thin that prices have been based on small sales, broker offers and even dealer offers. The latter find their yards filling up and no one interested. This week the Pittsburgh scrap market on heavy melting steel slid off an average of $4.25 a gross ton. At Chicago the decline was $2.00 a ton and at Philadelphia the drop was an average of $5.00 a ton with the market still showing weakness.

Lower scrap prices have been blamed on (1) open winter, (2) imports from abroad, (3) heavy inventories at steel plants and (4) lethargy of scrap consumers to load up at even new low prices. The real reason may be something a little more than those mentioned.

It may be that the new low scrap prices are also due to (1) probability of a drop, of significant proportions, in steel buying, (2) unloading of industrial scrap on the open market instead of this scrap going back to the steelmaker from the steel consumer, (3) folding up of the conversion market which supported higher prices and finally (4) the free nature of scrap in a general business situation which shows the bloom to be off inflation.

WARNINGS that the long term outlook for scrap is bad are falling on deaf ears. Steel firms are intent on reducing supplies—even if it means that prices may rebound later. Most steel people feel that inflationary scrap prices are out the window for a long time. No one is worried about the possibility of the market turning upward at a later date.

In the steel market all is not serene. Sales officials are now sure that the buyers'market in steel is not far away—for the whole market. It is already here in alloy steel, pig iron and is breathing on hot-rolled bar makers. One large company which had higher hot-rolled bar prices than the majority of the industry has dropped its quotations to a competitive level this week. All other steel firms which have higher prices will drop them to a competitive level soon—unless they are uninterested in selling that particular product

The quota system—used to distribute steel on a historical basis—is beginning to crack. Some steel companies have quietly booked more tonnage for the summer months than they will be able to produce. The reason for this? Those firms feel that many consumers have ordered more than they will take when the shipping time comes. In order to be sure that operations will not drop sharply steel firms have booked additional tonnage to take up any slack that shows up.

The trend to book tonnage over and above what the mill is expected to produce is picking up speed. If the price of steel should go up because of increased labor and mining costs, consumers with inventories will be in a good position. But it is not at all certain now that basic steel prices will be advanced this year. The drop in scrap prices and fuel oil and the appearance of the buyers' market must be reckoned with before any large steel firm considers raising the base price of steel.

BUT steel people are going to be squeezed hard on the cost angle. Higher freight rates have been a factor in steelmaking costs. Even though the price of scrap has declined sharply most companies are still operating with high cost inventories. The captive coal mines are in for a tussle with the United Mine Workers which will probably cost the steel firms more money. The steelworkers are bound to get some kind of a social security package even though no cents-per-hour raise is granted. This will swell labor costs. In the face of all this steel firms must take account of a downward trend in steel business. A decline in base steel prices will be resisted as long as possible.

The steel ingot rate this week is down 1½ points to 100.5 pct of rated capacity. Part of this drop has been due to furnaces working on steel conversion being taken out of operation.

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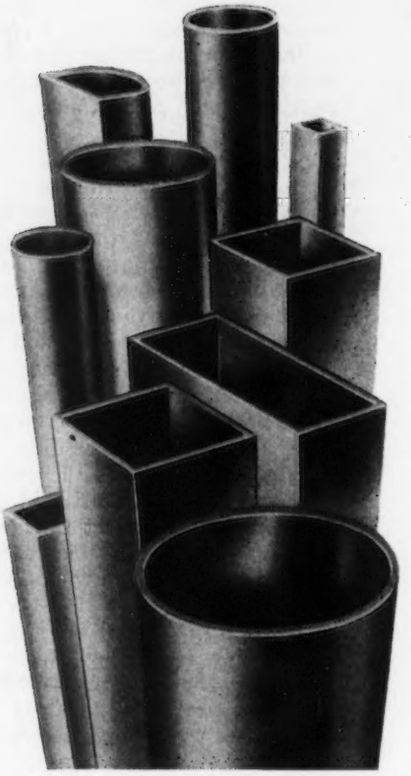

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Caught Up!

Consumers Slash Prices, Cut Output; Conversion Bloom Fades

Steel Market Near Normal As Big Consumers Are Now Catching Up

By D. I. BROWN
Chicago Editor

Chicago

• • • **The string has** run out and the steel industry knows it. All the pat hands held by the producers for so long are gone. No segment of the industry is sure where we go from here, except we aren't going up. Cuts in production of metal goods, reductions in prices, squeezing of costs, competitive selling and all the facets of the business forgotten for so long are back, and they are back with a suddenness that caught the unbelievers flatfooted.

Inventories, much published reason for caution by steel consumers, are a result of caught up demand. They are not the primary cause for the return of a buyers' market, slashes in production, price cuts, etc.

A large washing machine company in New York State is trying to peddle about 1 million lb of excess aluminum inventory. Steel brokers can't sell their ingots—Detroit steel users last week looked them in the eye and offered scrap prices. The move to get out of sheet and strip conversion deals threatens to break into a headlong stampede.

Already a few blast furnaces are on slack wind because the operators can't sell the pig iron. Bonus tonnages, even in flat-rolled products, are becoming as prevalent now as quota cuts were 6 months ago. The government voluntary allocation programs are being scuttled and Truman's threat of government built steel mills isn't even a good joke.

Large converting mills in Chicago and Detroit have big tonnages of semifinished piled in their yards. It is expected that consumers will still take the sheets and strips made from these ingots and slabs. If they don't, and they can cancel, these large banks of semifinished represent an awful lot of cold steel to have sitting around should general steel demand fall off.

There are a few diehards in the Midwest who talk willy-nilly about government spending taking up the coming slack. But even they admit there isn't enough money available to subsidize, prop, floor or support the weight of America's metal industry once it starts to settle in all four corners—scrap, pig iron, steel, and nonferrous products.

Steel is the cornerstone of our present economy and what happens to steel will sooner or later

Caught Up?

govern the pace. Consensus in the Midwest is that we are caught up in steel production. Those items not yet caught up, like cars, will do so in 30 or 60 days and by June steel producers will be out looking for orders. Line pipe is the lone product which may not catch up this year.

How do they get that way? Listen. Steel consumers all over the country are getting all the supplies they want or need. Appliance makers from largest to smallest have cut production, cut costs, cut prices and say they expect to be cutting each other's throats next.

The railroads don't want any more freight cars. They are getting all the steel they need including rails and plates. All they want is a pickup in car loadings, a decent break with labor, and a reduction in the cost of steel. The last 6 pct temporary freight increase, Chicago freight rate analysts told THE IRON AGE, will be the last rate increase. The roads won't get the rest of the requested increase. Some freight men say they don't want it, because they aren't going to let the other carriers take any more business away from them than they already have.

Farm implement makers are current on most items. Shipments of high priced pig iron, sheets, etc., are scheduled to end by May 1 for most manufacturers in this area. Price reductions are expected in some lines by summer. These price cuts are a certainty if labor is held in check in the months to come.

Price reductions can be afforded, observers here declare, because premium price materials won't be necessary and workers are really putting out a day's work. Price reductions of farm implements, however, some implement makers imply, may be mandatory before they can really afford to make them—as competitive selling recognizes only volume.

Makers of electrical equipment from large generating apparatus to transformers are catching up fast. Electric motors have been a glut on the market for months. Firm prices are now being quoted on any apparatus which can be delivered in 90 days. The old 20 pct maximum escalator clauses on large equipment have been reduced to 10 pct.

Price cuts have already been enforced by makers of industrial electrical machinery. More cuts are expected in additional lines. Executives of companies making these goods told THE IRON AGE that competition, not costs, is going to govern prices from here on. Delivery on even large electrical equipment has improved by 3 or 4 months since last fall.

Scrap, historic bellwether of the steel industry, is still in the dumps. Nobody wants to buy it. Brokers and dealers were running around 90 days ago yelling "Henny, Penny, the sky is falling" and they were right. If scrap goes any lower, steel price reductions can be expected, observers here declare. If steel demand continues to lessen as much in the next 30 days as it has in the past 60 days, there will be no doubt that steel prices will decline. Steel consumers are already talking about this to the steel salesmen.

Employment in the 7th Federal Reserve District was above the rest of the nation last October. Since then it has slipped. Unemployment in this area today is going up and it is particularly acute in the durable goods or metalworking plants. The foundries in this area felt it first a few months ago but today it is general in many metal fabricating plants in the area. Late tabulations show employment 4 pct lower than a year ago in durable goods industries for the 7th Federal Reserve District.

The construction industry is competitive. Bidding is keen. For the first time since the war a large contractor in Chicago bid under the estimate made by the city of Chicago on a highway project. This company underbid the estimate by 15 pct. Last year projects were continually being abandoned in this area because bids in cases ran as high as 100 pct over the estimate. Steel for the gas and oil industry, Texas operators told THE IRON AGE, is adequate except on pipe. Oil country pipe demand, they feel, will taper off very soon.

Thus there are few major industries left in which the markets haven't shrunk and price isn't a major factor. This means less steel is needed and a drive by consumers to obtain lower steel prices is in the offing.

Automotive makers so far are an exception. They have cut out conversion and gray markets but they are still yelling for more mill quota sheets. One look at a dealer's window anywhere in the country indicates this won't last long

either. Detroit is either in the dark on present day conditions; they are praying for a tremendous upsurge in the spring; they must get all inventories into saleable products immediately; or they have decided to build every unit possible now in anticipation of major, long time strikes later in the year.

For sale signs are being posted on the high cost steel mills for which customer syndicates and consumers paid high prices a year ago. Apollo Steel Mfg. Co., Arnold Maremont told THE IRON AGE, is for sale. The old Price Chapman mill in Indianapolis, run last year as Whitney Steel Co., rolling converting tonnage only, is cold. Kaiser-Frazer so far has not sold the Phoenixville Steel Co. which they purchased the middle of last year, but they have talked about it to prospective buyers. These facts along with the large price reductions made recently by Kaiser on steel products from Fontana aren't straws any more. The back of the steel shortage has been broken.

Steel consumers and warehousers of metal products in this area attest to this fact. Steel producers say that so far they have no final evidence that this is true. As usual they are going to be the last to find out. Privately many steel executives are even more worried about the steel markets than the scrap dealers are worried about the scrap market. They have been receiving large cancellations. They have been passing out bonus tonnages.

When the mills open their books for the third quarter we will get the first accurate measure of where the industry stands. Observers here predict that those shouting for more steel capacity are in for a shock. It might be surprising to the industry itself, too, but they won't be shocked —they have been through this wringer before.

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Reduces Plant Production

Mansfield, Ohio

• • • **The Westinghouse** Electrical Appliance Div. here will cut production of ranges, laundry equipment and small appliances by 12 to 30 pct beginning Apr. 4. The "gradual stepping down" of production does not affect refrigerators.

Furnaces in Pittsburgh District Down As Orders for Quality Steel Lag

Pittsburgh

• • • **Five steel** plant openhearths and four electric furnaces were down this week in this district, primarily for lack of orders for quality steels. In addition, most of the furnaces in foundries and specialty shops which were melting ingots for conversion deals are now off.

Among the victims of the conversion collapse is the latest purchase for this purpose, the four-furnace openhearth shop of Crucible Steel's Park Works. This shop is operated by Crucible for its new owners, Deere & Co., agricultural equipment makers, Moline, Ill. Only one of its four furnaces is scheduled for operation in April.

Allegheny Ludlum has taken off three openhearths and an electric furnace at its nearby Brackenridge plant. A decline in orders for electrical sheets, stainless and alloy steels was blamed.

The drop in stainless and alloy business has idled three electric furnaces at Midland Works of Crucible Steel. This company also found that because of demand softness it could take off two openhearths at the same plant so as to permit shutting down the new hot strip mill to add equipment. An ingot handling crane is being installed and shears are being placed between the universal mill and the hot strip mill. Both these items for the new mill arrived too late for installation with the original equipment last fall.

Conversion Bloom Withers

Cleveland

• • • Republic Steel Corp. has shut down two openhearth furnaces and six electric furnaces because of a decline in demand for conversion steel.

A Republic spokesman said one openhearth and three electric furnaces at Canton, Ohio, had been taken out of production and an openhearth at Massillon, Ohio. Three electric furnaces in Republic's Chicago District have also been shutdown.

The furnaces shutdown are not a part of Republic's rated capacity, but were made operative solely for conversion tonnage, the spokesman said.

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A BIG BLOW: *Two blowing Bessemer converters at the Ensley Works of U.S. Steel's Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., give a brilliant display. They are pre-refining molten iron. The result is the production of more steel by the openhearths. Each converter shown in this picture has a capacity of 22 tons per blow.*

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Industrial Briefs . . .

• NEW TOOLS—Robert B. Douglas, president, Godscroft Industries Ltd., Montreal, has been elected president of the American Society of Tool Engineers. Herbert L. Tigges, vice-president, Baker Bros., Inc., Toledo, was named first vice-president. J. J. Demuth, general superintendent, Sligo Iron Stove Co., St. Louis, is second vice-president; and Halsey F. Owen, professor of industrial engineering, Purdue University, Lafayette, Ind., is third vice-president.

• STARTING OUT—R. J. Chmiele and Joseph Haroski, formerly chief engineer and shop superintendent respectively of the Master Form Tool Co., have founded a new company, the Profile Tool & Mfg. Co. in Chicago. They will manufacture precision cutting tools for use in high speed production machines.

• GET TOGETHER — American Brake Shoe Co. has announced the addition of the National Bearing Div. in its sales offices at 915 Midland Bldg. in Cleveland. L. E. Hoyer and J. Robert Lottes are the National Bearing sales representatives.

• BRANCHES OUT—Cutler-Hammer, Inc., Milwaukee, has announced the opening of a Newark branch office at 155 Washington St., headed by W. M. Reese. The new office will operate under the supervision of the company's New York district office.

• TAKES OVER—Thomas C. Wilson, Inc., Long Island City, N. Y., manufacturers of tube cleaning equipment, has purchased the tube expander business of Richard Dudgeon, Inc., New York. In the future Richard Dudgeon, Inc., will devote its entire efforts to the production of hydraulic machinery.

• NEW MARKET — Williams & Co., Inc., metal distributors, with headquarters in Pittsburgh, has moved into its new Cincinnati warehouse at 3231 Fredonia Ave.

• NEW SMELTER — Morris P. Kirk & Son, Inc., a subsidiary of National Lead Co., has announced the opening of a new nonferrous smelter and refinery at Portland, Ore. J. K. P. Miller is plant manager in charge of operations.

• ACQUIRES RIGHTS — Syncro Machine Co., Perth Amboy, N. J., manufacturers of standard and special machinery for the wire industry, has announced the acquisition of sales and manufacturing rights to the Cook continuous electric strand annealer developed by the Cook Engineering Co., Paterson, N. J.

• EXPANDS—The Electric Auto-Lite Co., Toledo, has announced the opening of a new plant at Lockland, Ohio. Facilities for machining, finishing and plating all diecast parts by mass production methods have been installed here. Also in operation are the full research facilities necessary for quality control.

• MADE PRESIDENT—After serving as a director for 7 years, Jack Downs of the Clements Mfg. Co., Chicago, has been elected president of the Clearing Industrial Assn.

• AT HOME—The Detroit Nut Co. has announced that they are moving their plant from 2456 Hubbard Ave. to 369 Midland Ave., Detroit.

• SCRAP SALE—The Detroit Arsenal of the War Dept., Center Line, Mich., will accept bids up to Apr. 5 on the sale of approximately 80 gross tons of miscellaneous unprepared heavy iron and steel scrap, 30 gross tons of prepared iron and steel scrap and some other items.

• PROGRESSING — Delivery of structural steel is expected shortly for a new $4 million aluminum foil mill being built by Aluminum Foils, Inc., at Jackson, Tenn. It is hoped that the mill will be in operation early next year.

Police Arrest Trucker Hauling 66 Tons of Steel

Pittsburgh

• • • **A truck carrying** 132,000 lb of structural steel, the biggest overload ever reported to Pennsylvania State Police was caught near Bethlehem last week. Police said it had caused at least $15,000 damage to the highways. Maximum penalty upon conviction for overloading is a $50 fine and costs.

The arrest came at a time when the Pennsylvania truck lobby was seeking to boost the legal load limit from the present 45,000 to 60,000 lb on double axle semi-trailers. Single axle semi-trailers would be allowed to carry 48,000 lb instead of the present 45,000-lb limit.

The truck, bound for Hoboken, N. J., was said to have been loaded at Clairton Works of Carnegie-Illinois Steel Corp., near here. It got to within 20 miles of the New Jersey state line before being flagged down by the police. It proceeded after the driver was given a summons.

Capt. Charles C. Cook of the state police said that his estimate of the $15,000 highway damage was conservative. Some steel traffic men have come out in favor of increasing allowable truckloading in Pennsylvania, whose limits are below those of neighboring states. They have never suggested much more than the trucking companies are seeking and no one has ever mentioned 132,000 lb loads.

K-F Changes Organization

Detroit

• • • **The often-rumored** break between Kaiser and Frazer interest of K-F Corp. came out in the open this week with the announcements that Edgar F. Kaiser would go up to the presidency, succeeding Joseph W. Frazer. The latter will become vice-chairman of the board of directors, a newly created post. O. B. Motter and W. A. McDonald, formerly vice-presidents of the company, have been removed from the board of directors. Henry J. Kaiser continues as chairman.

Simultaneously, price cuts of 14 pct or $334 on the Kaiser Special and $198 on the Frazer were announced.

New Casting Corp. to Use Controlled Atmospheres

Philadelphia

• • • **Formation** of the Vacuum Casting Corp., 401 E. Erie Ave., Philadelphia, has been announced by F. O. Hess, president. Mr. Hess is also president of Selas Corp. of America.

The new corporation will develop techniques of refining and casting metals in vacuum and in controlled atmospheres. These new techniques are said to offer particular advantages in handling alloys based on titanium, chromium, molybdenum, magnesium and other high temperature and/or reactive materials. It also minimizes the problems of precision casting alloys such as Alnico, and materials where the exclusion of gaseous or solid contaminants is desired.

Officers of the corporation, in addition to Mr. Hess, are: treasurer, R. L. Wood, president, Arwood Precision Casting Corp.; secretary, E. W. Mason; assistant treasurer, Max Wendt, manager, Arwood Precision Casting Corp. Deavidlee Von Ludwig was appointed director of research. The board of directors consists of the officers previously named and T. W. Metcalfe, president, Long Island University.

Reports Increased Sales

Niagara Falls, N. Y.

• • • **Harper Electric Furnace** Corp., manufacturer of high-temperature electric furnaces and electric kilns, reports 1948 sales showed a substantial increase. Even with its expanded production facilities, a company spokesman said, it has been found necessary to subcontract to several plants to meet schedules.

Death Claims S. E. Bremer

Palm Beach, Fla.

• • • **S. Eugene Bremer,** president of Copperweld Steel Co., Pittsburgh, died Mar. 24 of a heart attack. He was 63 years old. Mr. Bremer helped to organize Copperweld, serving as the first vice-president and general manager. He became president in 1929.

Mr. Bremer was born in Warsaw, Poland and came to this country at an early age. He had been prominent in industrial and civic affairs for the past 35 years. He was a trustee of Montefiore Hospital and had served as a director of the Pittsburgh Chamber of Commerce, the Civic Club and the Pennsylvania Society. He is survived by his widow, a daughter, a brother, three sisters and two grandchildren.

Submits Lowest Bid

Buffalo

• • • **The Siegfried Construction Co.** of Buffalo submitted the low bid of $271,650 for construction of residence buildings at the Buffalo Veterans Administration Hospital project.

The government estimate was $279,632 and other bids ranged from $278,900 to $300,000. The government will furnish the fabricated steel for the staff apartments and male attendants' quarters.

Resumes Plant Operations

North Tonawanda, N. Y.

• • • **The Rudolph Wurlitzer Co.** recently recalled more than 700 workers and resumed manufacturing operations after a 3-week shutdown for inventories. A spokesman said inventories of coin-operated phonographs were down and that sales of juke-boxes and electronic organs had picked up in the last few months.

Hopes to Introduce New Furnace Developments

New York

• • • **E. G. Malmlow,** of ASEA, Sweden, arrived recently in the United States to investigate the possibility of introducing several recent Swedish developments to American industry.

Among the items Dr. Malmlow is discussing with various American engineers are a nickel-cadmium battery, vacuum furnaces capable of operating at up to 4000°F, and stirring coils for use with arc furnaces.

The nickel-cadmium battery will shortly be in large scale production in Sweden, Dr. Malmlow reports, following extensive development work with a pilot plant.

Reports 8-Month Low In Car Registrations

Detroit

• • • **New car** registrations during February were the lowest since June 1948, according to R. L. Polk & Co., Detroit, statisticians for the automotive industry. Polk estimated new cars registered in February 1949 at 261,000. This compares with 246,926 new cars licensed in June 1948, the lowest month of last year and 249,781 new cars registered in February 1948.

Coming Events

Apr. 4- 6	**American Gas Assn.,** distribution, motor vehicle and corrosion conference, Cincinnati.
Apr. 5- 6	**Metal Powder Assn.,** annual meeting, Chicago.
Apr. 8- 9	**Lead Industries Assn.,** annual meeting, Chicago.
Apr. 11-12	**American Machine Tool Distributors' Assn.,** spring meeting, Savannah, Ga.
Apr. 11-12	**American Zinc Institute,** annual meeting, St. Louis.
Apr. 11-14	**National Assn. of Corrosion Engineers,** annual conference and exhibition, Cincinnati.
Apr. 11-15	**Western Metal Congress and Exposition,** Los Angeles.
Apr. 14	**National Castings Council,** annual meeting, Cleveland.
Apr. 18-20	**Midwest Power Conference,** Chicago.
Apr. 18-20	**American Institute of Mining and Metallurgical Engineers,** annual conference of Openhearth Steel Committee, Chicago.
Apr. 19-20	**Magnesium Assn.,** annual meeting, Chicago.
Apr. 22-23	**American Institute of Mining & Metallurgical Engineers,** New England regional meeting, Springfield, Mass.
Apr. 25-26	**American Supply & Machinery Manufacturers Assn.,** Triple Mill Supply convention, Cleveland.
May 2- 3	**Assn. of Iron & Steel Engineers,** annual conference, Baltimore.
May 2- 4	**American Society of Mechanical Engineers,** spring meeting, New London, Conn.
May 2- 5	**American Foundrymen's Society,** annual convention, St. Louis.
May 4- 7	**Electrochemical Society,** semiannual meeting, Philadelphia.

Stock Holdings In Liberian Iron Ore Concession Stated

Cleveland

• • • **Liberia Mining Co.** in which Republic Steel Corp. has a stock interest, and Liberia Co., of which Edward R. Stettinius is board chairman and chairman of the executive committee, are separate, distinct and unrelated corporations.

According to a statement by Republic Steel Corp. spokesmen and Lansdell K. Christie, president of Liberia Mining Co., "confusion has been created in the minds of the American public by press releases which have confused Liberia Mining Co. with another separate, distinct and unrelated corporation, The Liberia Co."

For full details on Liberian iron ore see THE IRON AGE, *Feb. 24, p. 143, and Mar. 17, p. 141.—Ed.*

The Liberia Mining Co. in which Republic Steel has recently acquired a stock interest, has for the past 2 years been developing iron ore properties in the Republic of Liberia.

"There is also in existence a company known as the Liberia Co., headed by Edward R. Stettinius, which owns a small stock interest in the Liberia Mining Co.," the statement pointed out.

"The Liberia Mining Co. was formed in 1946 and preceded by some 2 years the Liberia Co.

"The Liberia Mining Co. was organized and the concessions covering the iron ore properties it controls were granted to Lansdell K. Christie of New York City, president of the company.

"Upon completion of the transaction between Republic Steel Corp. and the Liberia Mining Co. more than 80 pct of the stock of the latter company will be owned by Republic Steel Corp. and Mr. Christie."

Mr. Stettinius is a former U.S. Secretary of State, former president of General Motors Corp. and was chairman of the U. S. Steel Corp. finance committee from 1938 to 1940.

Lets Contract for Plant

Pittsburgh

• • • **General Motors Corp.** let the contract for its 725,000 sq ft stamping plant near here last week to Ragner Benson Corp., Chicago. Building will start immediately. The plant, which will employ 2500 at peak operations, is located in Mifflin Township, just across the street from the Irvin Works of Carnegie-Illinois Steel Corp.

It will produce body parts and subassemblies for Fisher Body assembly plants, particularly those in the East. It is estimated that the new unit will use approximately 250,000 tons of sheets a year. Despite its location, Carnegie is not expected to be the sole sheet supplier.

Renovation of a building for a smaller blanking plant in nearby Ambridge, Pa., is complete and operations were slated to start there this week. The schedule at the Mifflin Stamping Plant calls for: (1) Start steel framework June 15; (2) begin installing machinery Aug. 15; (3) die tryouts November; (4) begin operations April 1950.

Unemployment Claims Show Downward Trend

Washington

• • • **Claims for unemployment** insurance dropped again during the week which ended Mar. 12, according to the Federal Security Agency. The number of continued claims filed—1,939,700—was 39,000 less than in the preceding week.

"The gradual downward trend for new unemployment which has been evident since the beginning of the year continues in effect," FSA said. New claims for unemployment benefits totaled 319,010, an increase of about 2,000 over the previous week.

FSA said that layoffs in Pennsylvania occurred in glass, radios, stoves, automobiles, and electrical machinery. Illinois layoffs were mainly in stoves, automobiles, iron foundries, radio cabinets, and farm equipment.

Connecticut layoffs were reported in bearings, brass and brass products, and hardware, electrical appliances, apparel, metal products, chain electrical products, clocks, and typewriters.

Continental Sales Down

Detroit

• • • **Continental Motors Corp.** and subsidiaries have reported net earnings of $621,243 for the quarter ended Jan. 31, 1949. Sales during the period totaled $22,611,901 compared with $26,475,045 a year ago.

Net working capital increased more than $2 million to $21,293,294, the report said. Cash was up nearly $2,759,000 and inventories were down $1,622,800, totaling $18,492,654.

AMERICAN IRON AND STEEL INSTITUTE
350 Fifth Avenue, New York 1, N. Y.

Blast Furnace Capacity and Production—Net Tons

FEBRUARY - 1949 (Month)

	Number of companies	Annual blast furnace capacity	Production: Pig Iron — Current month	Pig Iron — Year to date	Ferro manganese and spiegel — Current Month	Ferro manganese and spiegel — Year to date	Total — Current month	Total — Year to date	Percent of capacity — Current month	Percent of capacity — Year to date
DISTRIBUTION BY DISTRICTS:										
Eastern	12	13,353,580	983,936	2,087,888	29,736	64,238	1,013,672	2,152,126	98.9	99.7
Pittsburgh-Youngstown	17	26,625,920	1,974,695	4,106,133	18,084	38,837	1,992,779	4,144,970	97.6	96.3
Cleveland-Detroit	6	6,984,600	536,578	1,125,678	-	-	536,578	1,125,678	100.1	99.7
Chicago	7	15,655,390	1,077,667	2,257,703	-	-	1,077,667	2,257,703	89.7	89.2
Southern	9	5,010,060	387,946	x 819,685	5,685	13,245	393,631	x 832,930	102.4	102.8
Western	4	2,912,300	209,082	441,519	-	-	209,082	441,519	93.6	93.8
TOTAL	37	70,541,850	5,169,904	x10,838,606	53,505	116,320	5,223,409	x10,954,926	96.5	96.1

Cutbacks in Voluntary Allocations Strengthen View That Program Is Doomed

Washington

• • • **Last week's** announcement of substantial cutbacks in the steel tonnage allotted to the various voluntary allocations programs was somewhat anti-climatic, according to seasoned Capitol Hill observers. Coming in a week when two major steel producers were banking furnaces, prices were cut by Henry Kaiser, and scrap prices were dropping still further, the announcement of the June cutbacks in the government programs only served to strengthen the view that Congress would not extend the voluntary allocations law beyond its present expiration date of Sept. 30.

Effective June 1, the cutbacks announced by Commerce Secretary Charles Sawyer amount to 150,629 tons in the 14 programs which last month required 539,046 tons. However, four new programs, scheduled to become effective during April and May, will require a monthly total of 56,385 tons, reducing the net cutback to 94,244 tons a month.

The new plans, with approximate average monthly amounts of steel products to be made available, are: baseboard radiation, 950 tons; requirements of ECA countries, 33,300 tons; farm-type grain bins, 8400 tons; and Federal reclamation projects, 13,600 tons.

The accompanying table shows the amounts of steel made available monthly for each of the voluntary programs in operation during February and the amounts available under the same plans beginning June 1.

Voluntary Allocations—Comparative Monthly Requirements

Program	February (Tons)	June (Tons)
Anthracite Mining ...	2,570	2,000
Armed Forces	102,505	64,371
Atomic Energy	22,265	10,340
Barges	20,000	11,202
Federal Aeronautical Agencies	1,926	614
Freight Cars	247,876	174,953
Manganese Ore Cars...	2,192	2,192
Merchant Vessels	10,195	11,729
Mining Machinery	26,400	31,785
Oak Ridge Pipe Line..	4,750	4,750
Steel Houses	9,835	(Expired)
Tank & Oil Field Production Equipment...	16,530	16,530
Tankers	40,380	31,551
Warm Air Heating Equipment	31,622	26,400
	539,046	388,417
New Plans to become effective in April or May		56,385
TOTAL		444,802

Voluntary Programs Monthly Requirements By Product Tonnages Beginning June 1

Product	Beginning June 1	Total Change —1949
Plates	186,686	23,953 less
Shapes	60,803	27,600 less
Sheets and strip, H. R.	55,028	10,862 less
Sheets and strip, C. R.	14,898	3,993 more
Sheets and strip, other	28,354	1,870 less
Bars, H. R., incl. reinf.	53,780	14,116 less
Bars, C. R.....	2,457	4,228 less
Tubular, incl. line pipe and oil country	19,731	11,675 less
Rod and wire...	2,850	1,615 less
Rails and accessories	1,836	1,676 less
Wheels and axles, etc.	13,660	21,555 less
Tin and terne..	150	150 less
Miscellaneous ...	4,569	.....
Totals	444,802	123,293 less

The second column shows total cutbacks expected as of June 1 since the first of the year, including the current cutback of 94,244.

GM Using Wheeling Furnace

Pittsburgh

• • • **General Motors** Corp. last week released details of an old contract to obtain pig iron from a Wheeling Steel Corp. furnace at Mingo Junction, Ohio. The arrangement was made last November when pig iron was in particularly tight supply.

It is understood that General Motors supplied the funds to rebuild the furnace, which had been abandoned by Carnegie-Illinois and purchased by Wheeling in April 1946. Wheeling will operate it for General Motors.

Armco Steel Earnings Up

Middletown, Ohio

• • • **Consolidated net** earnings of Armco Steel Corp. in 1948 after taxes were $32,030,712 as reported by the Annual Report recently released to shareholders. After preferred dividend requirements this was equivalent to $8.00 per share of common on the basis of 3,891,526 shares, the average number outstanding on which dividends were paid. Sales for 1948 were $382,563,811. Net income was equal to 8.4 pct of sales.

In 1947 earnings were $25,002,211 on sales of $311,685,322, or $7.44 per share of common stock after preferred dividends. More shares of common, however, were outstanding in 1948 as a result of the 20 pct stock dividend paid in February, 1948. If the same number of shares had been outstanding in 1947, earnings for that year would have been $6.19 per share.

To Supervise Operation

Pittsburgh

• • • **H. S. Newhall,** manager of the Electrothermic Div. of the Pittsburgh Lectromelt Furnace Corp. here, will leave Apr. 25 for a 2 months' visit to Norway, Sweden and England.

He will supervise the initial operation of an electric furnace installation at the Porsgrunn Elektrometallurgiske A/S plant in Porsgrunn, Norway, and will consult with European engineers on the latest developments in electric furnace ore reduction.

Purchases New Plant

St. Louis

• • • **A plant** consisting of industrial buildings containing 90,000 sq ft and located on an 8 acre tract at Mt. Vernon, Ill., has been purchased by the Wagner Electric Corp. here.

The Mt. Vernon plant is the second Illinois property to be acquired by Wagner Electric and will be used for building transformer tanks. Early in 1948 a plant located at Edwardsville was purchased, and adapted to the manufacture of automotive brakes and hydraulic industrial brakes. This plant is now on a full-time production **basis.**

Altogether, by purchase and by additions to its main plant in St. Louis County, Wagner Electric has increased its manufacturing capacity approximately 50 pct since the end of the war. The company's products are electric motors, transformers, industrial braking equipment, air brake systems for heavy automotive vehicles, brake linings, and hydraulic brakes, repair parts and fluid.

Increase in Canadian Output for Primary Iron and Steel Shapes

Toronto

• • • **Canadian production** of primary iron and steel shapes for the month of Dec., 1948, totalled 300,585 net tons as compared with 294,228 tons in Nov. and 270,922 tons in Dec., 1947. Output for Dec. included 286,493 tons of carbon steel shapes and 14,092 tons of alloy steel shapes. In the production figures for Dec. are included 66,005 tons of shapes shipped to producers own plants or plants within the primary industry for further processing.

Shipments for sale of primary iron and steel shapes in Dec. amounted to 212,886 net tons of which 199,703 tons were carbon steel shapes and 13,183 tons alloy steel shapes; in Nov. shipments totalled 219,363 tons and included 209,793 tons of carbon and 9570 tons of alloy steel shapes, and for Dec., 1947, shipments amounted to 178,273 tons and included 169,912 tons of carbon and 8361 tons of alloy steel shapes. The above figures which show iron and steel shapes for sale, do not include deliveries for further processing.

The accompanying table shows production and shipments for sale of primary iron and steel shapes for the month of Dec. in net tons.

Item	Carbon Steel Made	Carbon Steel Shipped	Alloy Steel Made	Alloy Steel Shipped
Billets, etc., for forging	8,489	6,648	2,229	2,327
Other semi-finished shapes, not for rerolling by makers	38,330	56	514	...
Structural shapes and piling	11,872	11,685	...	...
Plates	21,356	22,977	213	346
Rails	29,222	23,889	...	...
Tie plates and track material—				
Splice bars	38	30	...	...
Tie Plates	3,154	3,420	...	...
Spikes	930	941	...	...
Concrete reinforcing bars	7,031	6,031	...	...
Hot rolled bars for cold finishing	1,486	....	...	....
Other hot rolled bars	50,155	35,116	9,065	8,336
Pipes and tubes	10,265	13,105	...	...
Wire rods	25,523	23,468	96	94
Hot rolled black sheets	19,765	12,684	...	...
Cold reduced black sheets	5,286	4,443	...	...
Galvanized sheets	7,466	7,482	...	...
Steel castings	7,856	8,001	1,393	1,545
Miscellaneous hot rolled products	21,780	3,413	331	309
All other products	16,489	16,314	251	226
TOTAL	286,493	199,703	14,092	13,183

Producers' shipments of primary iron and steel shapes subdivided according to principal consuming industries for the month of Dec. in net tons, follow:

	Carbon Steel	Alloy Steel
Automotive industries	7,145	6,055
Agricultural, including farm machinery	10,279	1,408
Building construction	22,418	91
Containers industry	14,676	1
Machinery and tools	11,615	812
Merchant trade products	31,027	384
Mining, lumbering, etc.	5,530	549
National defense	15	7
Pressing, forming and stamping	10,997	126
Public works and utilities	1,210	12
Railway operating	24,579	576
Railway cars and locomotives	18,432	669
Shipbuilding	3,524	202
Miscellaneous and unclassified	969	111
Wholesalers and warehouses	25,772	396
Direct export		
(a) to British Empire	7,701	783
(b) to other countries	3,814	1,001
Total shipped for sale	199,703	13,183
Producers' Interchange	65,491	514

50 YEARS AGO

THE IRON AGE, *March 30, 1899*

• **"An interesting useful application of electric arc burning, says the Western Electrician, recently took place in Chicago in connection with reconstruction work in the New York Life Building."**

• "Although a liberal increase in the production of openhearth steel during 1898 was expected by the steel trade, we doubt whether many were prepared for the great jump in the output which has been shown to have taken place by the official statistics which we print elsewhere. An increase of 611,821 gross tons in one year, making the total for 1898, 2,220,492 tons, or close to 1/3 that of the make of Bessemer steel, is certainly an astonishing record."

• **"A movement is on foot to consolidate the blast furnace plants and mineral properties of the Sheffield district in Alabama."**

• "Circumstances of the late months have put a stop to the cry of a few years ago that there was so much iron ore in sight since the discovery of the Mesabi range that it would never be worth anything again. Concerns interested in mining and shipping, more especially those who had heretofore been lukewarm in their interest in ore supplies have been in the field for ore of late, and there has been quite a little boom in sales of lands on which ore has been proven."

• **"The Bethlehem Iron Co., South Bethlehem, Pa., have finished the armor plates for the barbettes of the new battleship "Illinois" amounting to 700 tons. A 15 in. plate representing this group, will shortly be tested at the Indian Head proving grounds."**

Reports Record Income

Pittsburgh

• • • **National Steel Corp.** reported net earnings of $40,121,506, equal to $16.35 per share on 2,453,900 shares, according to its twentieth annual report.

The results for the year compare with earnings in 1947 of $26,838,788, equal to $12.03 per share on 2,230,817 shares. Cash dividends in 1948 amounted to $11,154,085, or $5.00 per share, and the balance of earnings, $28,967,421, was transferred to earned surplus. In addition to the cash dividend, a 10 pct stock dividend was paid on Dec. 17, 1948.

Predicts Peacetime High for Iron Ore Movement In '49

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By W. A. LLOYD
Cleveland Regional Editor

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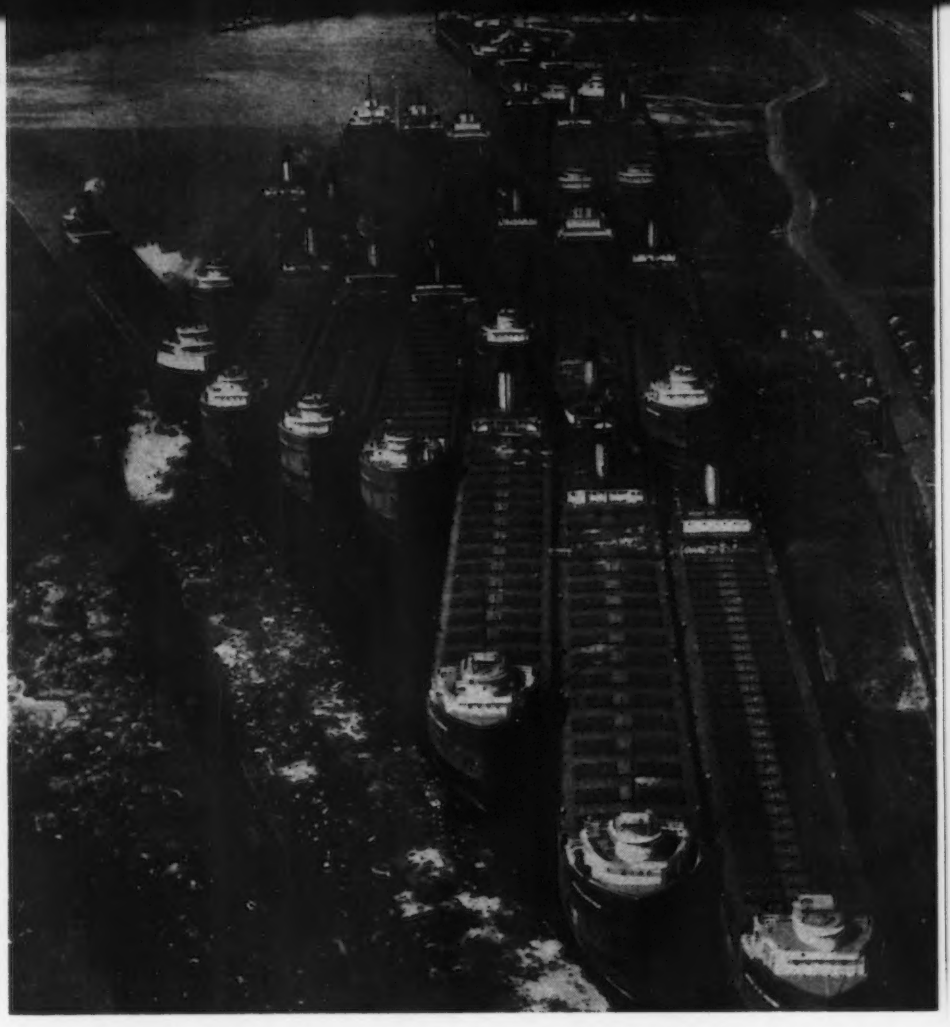


ORE BOATS: *Ore boats of U. S. Steel's Pittsburgh Steamship Co. make ready for one of the earliest openings of shipping in Great Lakes history. Each ship will traverse around 50,000 miles in the 7½ month navigation season.*

Cleveland

• • • **Movement of more** than 85 million gross tons of Lake Superior iron ore to lower lake ports this season was predicted here last week by authoritative sources in the iron ore trade as the first echelon of the iron ore fleet was leaving winter berths and steaming toward the Soo.

An 85 million ton movement would make a new peacetime high and top by a considerable margin the 83 million ton peacetime record set in 1948.

In addition to the lake tonnage, nearly 2 million tons of Lake Superior district iron ore is expected to move all rail to consumers in Duluth, Birmingham and other points.

As the experts here see it, weather and boat capacity are the only limiting factors in the iron ore movement this year. Boat capacity makes an early start particularly important.

The ice committee of Lake Carriers' Association met Mar. 23 and set Mar. 25 for the up-bound start. First elements of the fleet were expected to reach the Soo Mar. 27. In 1948, first ore carriers locked through the Soo Apr. 4. This year the first trip is expected to be made about 10 days earlier.

Boat capacity for an 85 million ton iron ore movement is a problem as it was in 1948, when capacity was taxed. The direct ore carrying fleet has a trip capacity of 2,600,000 gross tons. Other bulk carriers of U. S. registry available to the ore trade have a capacity of 200,000 tons, making the total trip capacity in U. S. registry 2,800,000 gross tons. The 40 Canadian ore carriers have a trip capacity of 330,000 gross tons, making a total ore carrying capacity of 3,130,000 gross tons.

There are 266 ore carriers in service this year, one less than in 1948, because the Reiss Steamship Co. converted an ore carrier into a self-unloader.

Canadian ore carriers moved 5,700,000 gross tons of iron ore in 1948 about 2 million tons between U. S. ports. The extent to which Canadian boats can contribute to the ore movement depends primarily on the navigation time remaining at the end of the grain movement. Canadian boats will probably be needed to carry about 6 million tons of iron ore again this year.

Legislation extending the authority of Canadian vessels to transport iron ore between U. S. ports on the Great Lakes was passed unanimously by the House, Mar. 21, and sent to the White House. The extension, offered by Rep. Alvin F. Weichel, (R. Ia.) would be until Dec. 15, 1949. It is a foregone conclusion that President Truman will sign this bill.

Another factor in the iron ore movement is the coal traffic. Operators estimate that 10 pct less coal will be hauled this season because of the mild winter, which will enable vessels to haul more ore, because turn around time in lower lake ports will be shortened.

Weather permitting, navigation can continue into December, when the steaming of ore is usually necessary.

At the current rate of consumption, an 85 million ton all-lake movement will be required to take care of the 195 blast furnaces, two more than were in blast during most of 1948, depending principally on Lake Superior district iron ore.

During 1948, mostly in the second half, new blast furnace capacity got into production, including two blast furnaces at Carnegie-Illinois' South Chicago

works, one in April and the other in June; a furnace at Pittsburgh Steel Co. in June and the Ford Motor Co. furnace in November. Two blast furnaces were dismantled, a Bethlehem furnace at Lackawanna and Pittsburgh Coke and Chemical Co.'s Sharpsville, Pa., furnace.

Cumulative consumption of Lake Superior district iron ore Mar. 1 was 14,582,896 gross tons, more than a million tons higher than the 13,497,253 gross tons consumed by Mar. 1, 1948.

According to trade sources, March consumption of Lake Superior iron ore will total about 7 million gross tons.

If iron ore consumption should decline somewhat during the season, it is unlikely that the lake movement would be reduced, because consumers are anxious to set up large stocks at lower lake docks and furnace yards. Stocks on hand at the opening of navigation have been too low, according to consumers, who point out that when the industry was consuming 45 million gross tons of iron ore a year, stocks May 1 were usually about 20 million tons.

Develops New Slant on Labor Relations

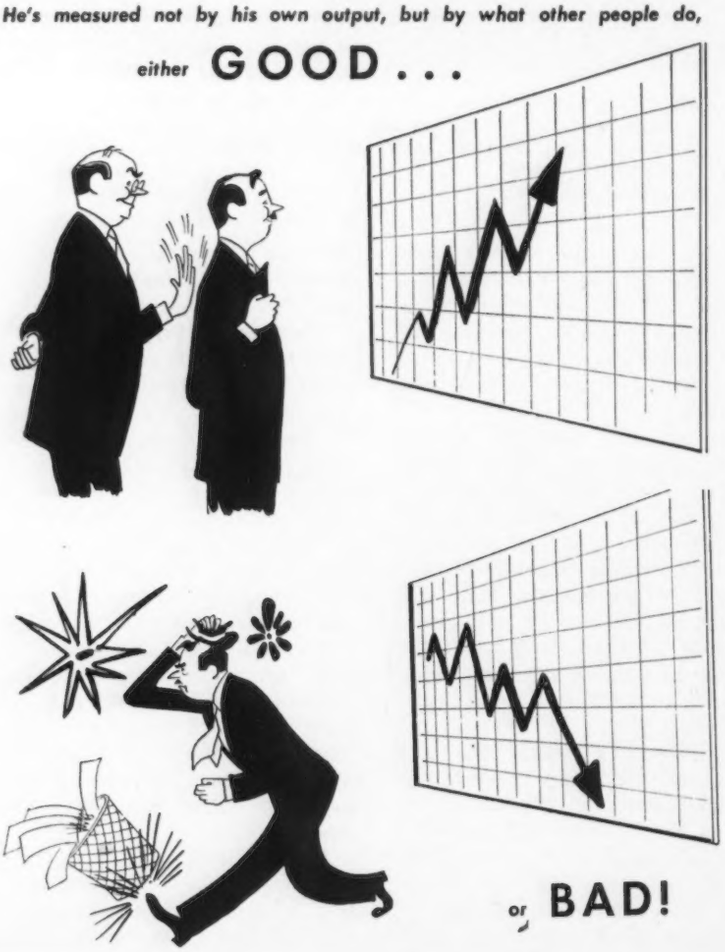
New York

• • • **An interesting aid** to better labor relations has recently made its appearance in industrial circles. It's a novel idea in the form of a twice-a-month cartoon letter on human relations aimed at foremen and supervisory personnel. Sponsor of the service is the National Foremen's Institute who sell to companies in bulk or mail direct to the company's list of personnel.

The idea is to keep people conscious of good human relations and do it with a smile. Also show them how. Called "The Human Side," the letter is prepared by J. Beckley and R. Baldwin and the staff of the Bureau of Business Practice of which A. C. Croft is president.

Authors develop the slogan, "Lead—Don't Drive." They say the interesting thing about a supervisor is that he isn't rated on his own personal production. "Whether he sits at a desk or races around a factory . . . it's the people who work for him who really do the job. He's measured not by his own output, but by what other people do—either good or bad. That's why a boss must know how to handle people . . . and how to get them to do their best.

"His real job is to help other people do a better job . . . through guidance, interest and appreciation."



Plan Regional Program

Boston

• • • **Six New England** governors have proposed a large-scale coordinated effort to develop natural and industrial resources of their states under the direction of a $2 million regional development authority.

Governor John O. Pastore, speaking for the group, said that the program would be carried out over a 10 year period by an organization known as the New England Development Authority and would be financed by a budget of $200,000 annually. Creation of a steel industry is mentioned by the authority as a possibility.

Reports Employment Down

Boston

• • • **Employment** continues to slump in New England. The number of workers employed during January was 3,204,000, a decrease of 133,600 from December and 91,700 fewer than in January 1948. Wendell D. McDonald, regional director of the Bureau of Labor Statistics, U. S. Department of Labor, made the announcement.

Plans Refresher Course

Detroit

• • • **A sales** refresher course is planned by Detroit Sales Executives' Club commencing Apr. 27 and continuing through May 25. Meetings will be held at the Tuller Hotel on Wednesdays, commencing at 6:30 p.m.

Federal Court Ruling Appears to Hamstring Freight Absorption

Absorption Is Returning But Customer Angle Still Is Nasty Problem

o o o

By GEORGE F. SULLIVAN
Pittsburgh Regional Editor

o o o

Pittsburgh

• • • **A Federal Court** decision has hammered another nail in the tight little box enclosing steel selling practice. Sparked by competition, freight absorption has been growing in recent weeks. After studying this decision some lawyers are beginning to wonder about absorption. The question is: Can you sell steel or any similar product to competing consumers on anything but a straight f.o.b. mill basis without running into complications?

The decision was that handed down Mar. 11 in the Seventh Court of Appeals in the case of Standard Oil Co., (Indiana), vs. Federal Trade Commission (No. 9215).

Steel companies have declined to agree to a proposed cease and desist order in their current case with the FTC. That order would have allowed steelmakers, acting in good faith, to meet competitors' prices in individual cases as long as it did not involve: (1) Consistently charging some customers more than others; (2) systematic equalization of delivered prices; or (3) injury to competition among steel fabricators.

The steel companies would not agree to that proposition. However, since they turned down this FTC "offer" several of the larger companies have been thinking about absorbing freight to meet competition in individual cases. They would act "in good faith" and there would be no hint of collusion. The orders involved would be big enough to permit handling them in a non-systematic fashion.

This would have left them legally clear under the first two provisions in the paragraph above which refers to the proposed FTC order. But item (3), covering possible injury to competition among steel users, is the one that has apparently been nailed down by the Standard Oil case.

In the order that caused the Standard Oil court action the FTC didn't question Standard's good faith. It was not like those cases where big companies have been accused of trying to ruin their competitors. The question was of injury among retail gasoline dealers.

Standard sold gasoline to four wholesalers in Detroit at 1½¢ per gal under the established tank wagon price. Between the tank wagon price and the retail sales price there was a 3.3¢ per gal spread. Two of these wholesalers took advantage of this price concession to sell Standard's gasoline at less than going retail prices.

The FTC's finding, supported by the Court, was that Standard's defense that the discriminatory price was made in good faith was not controlling because the discrimination affected and reduced competition at the retail level.

A somewhat similar set of facts might apply to many steel sales under the present marketing system. The following example shows one possible condition that lawyers feel would be illegal as a result of this latest court decision.

Mill A, to get an order from a fabricator near Mill B, sells him cold-finished bars at a price of $91. Freight absorption doesn't enter into this calculation. Mill A knows that Mill B sells at $90 f.o.b. and that the switching charge is $1. If he wants the business he must meet the price. It so happens that he absorbs some freight on the sale because of the distance involved.

But Mill A has another customer where there is no closer mill competition. This customer pays A's f.o.b. mill price of $90 plus freight of, say $6. Now if both these customers are equally distant from their mutal market one has a $5 raw material price advantage on the other. On many products, assuming both fabricators had equal labor costs, this price difference would hurt the business of the one paying the full freight.

Under the Seventh Circuit Court's Mar. 11 ruling, the FTC could bar Mill A from competing for this business near Mill B. That A acts in good faith would be no de-

OXYGEN LANCE: *D. W. Talbott (third from left), vice-president and general manager of The Cooper Alloy Foundry Co., Hillside, N. J., shows oxygen lance to Management Members of British Foundry Team just prior to demonstration of the use of oxygen to raise quality and cut costs in the casting of stainless steel.*

fense. Under the law the FTC need only show that the setup is such that competition *may* be injured.

How this will work in practice is uncertain. The larger mills may hew close to the line, checking the legality—or rather their best interpretation of the legality—of every transaction that is not strictly on an f.o.b. mill basis. To get business they may do this but because of the time and money involved it would have to be confined to big deals. Smaller steel buyers couldn't hope to benefit.

Some of the relatively smaller mills may choose to ignore the legal ramifications involved and just go about their business, colluding with no one and acting in good faith. If the FTC calls any of their practices illegal they'll stop. But the burden of finding these relatively small cases and compiling the evidence will be on the government—these mills don't have the legal staff to worry about it.

Construction Steel . . .

New York

• • • **The estimated total bookings** of fabricated structural steel for February totaled 106,203 tons, according to reports received by the American Institute of Steel Construction, Inc. The bookings for the first 2 months of the year amounted to 232,547 tons, which is 20 pct less than the bookings of the corresponding months of 1948, but 14 pct greater than the average bookings for the same 2 months in the 5 pre-war years 1936-1940.

February shipments were 140,467 tons, slightly under January, but 58 pct greater than the average February shipments of the pre-war period.

The backlog (tonnage available for future fabrication) for the next 4 months only stands at 683,224 tons.

The tabulation of bookings and shipments for the two months follows:

	Estimated Total Tonnage for the Entire Industry		Avg.
	1949	1948	1936-1940
Contracts closed			
Jan.	126,344*	160,634	107,578
Feb.	106,203	130,119	96,280
Totals	232,547	290,753	203,858
Shipments			
Jan.	150,518*	146,363	92,578
Feb.	140,467	141,556	88,626
Totals	290,985	287,919	181,204
Tonnage available for fabrication within the next 4 months	683,224	673,306	304,277

* Revised

o o o

SETTER: *Wilbur Crowe is setting the drills in a drill press which will drill rivet holes in a 25-ft steel column for the U. N. Secretariat building soon to be built in New York. The 13,000 tons of steel required for the 39-story structure are being fabricated in American Bridge Co. plant at Ambridge, Pa.*

o o o

• • • **Fabricated steel awards** this week included the following:

2300 Tons, Washington, D. C., warehouse and office building for Public Building Administration to Carnegie-Illinois Steel Corp., Pittsburgh.

800 Tons, Phoenixville, Pa., building, owner's name withheld, to Phoenix Bridge Co., Phoenixville, Pa.

375 Tons, Manitowoc, Wis., intake extension to Manitowoc Shipbuilding Co.

280 Tons, Newark Ohio, Pennsylvania R. R., to Bethlehem Steel Co., Inc., Bethlehem.

230 Tons, Milwaukee, Wis., Greenbaum power house to Milwaukee Bridge Co., Milwaukee.

210 Tons, Alwouez, Wis., ore spouts for Great Northern Railroad, to American Bridge Co., Pittsburgh.

185 Tons, Chicago, Diesel shop for Santa Fe Railroad to Hansell Elcock Co., Chicago.

125 Tons, Sudbury, Mass., elementary school, through S. Volpe & Son, Inc., Boston, to Bethlehem Steel Co., Inc., Bethlehem.

• • • **Fabricated steel inquiries** this week included the following:

2405 Tons, San Francisco, undercrossings and overcrossing, between Augusta St. and 25th St., California Div. of Highways, Sacramento, bids to May 4.

2200 Tons, Pittsburgh, freight terminal for Pennsylvania Railroad, Apr. 6.

300 Tons, Juneau, Alaska, Seward-Anchorage bridges, Public Roads Administration, Juneau, bids to Apr. 18.

250 Tons, Dauphin County, Pa., bridge for Pennsylvania Turnpike, Section 23-Am, due Apr. 11.

120 Tons, Philadelphia, recreation building at "B" St. & Wyoming Ave., due Apr. 5.

• • • **Reinforcing bar awards** this week included the following:

165 Tons, Cumberland Co., Pa., Pennsylvania Turnpike, Section 21-A2, through Brown, Davis & White, Lebanon, Pa., to Bethlehem Steel Co., Inc., Bethlehem.

• • • **Reinforcing bar inquiries** this week included the following:

1105 Tons, Ft. Collins, Colo., Horsetooth Feeder Canal, Bureau of Reclamation, Denver, Spec. 2613, bids to Apr. 19.

950 Tons, San Francisco, undercrossings and overcrossing, between Augusta St. and 25th St., California Div. of Highways, Sacramento, bids to May 4.

140 Tons, Dexter, Ore., relocation section of Oregon State Highway 58, Portland District, Corps of Engineers, bids to Apr. 12.

120 Tons, West Springfield, Mass., construction of dike and pumping stations, Daniel O'Connell Sons, Inc., Holyoke, Mass., low bidder.

• • • **Railroad car awards and inquiries** this week included the following:

Denver Rio Grande and Western R. R. has ordered 50 50-ton gondolas from Bethlehem Steel Co., Inc. Western Fruit Express has ordered 250 40-ton refrigeration cars from Pacific Car & Foundry Co. These cars had previously been scheduled to be built in Western's own shop.

Buyers Market Returns for Domestic Pig Iron Consumers

Buying Pressure Eases With Producers Catering to Customers' Demands

o o o

BY JOHN ANTHONY
Eastern Regional Editor

o o o

Philadelphia

• • • **In the space** of a few short weeks, the pig iron market in the East has changed to a buyers' market. Foundries no longer have to take whatever analysis iron the producer offers. Pig iron buyers are reveling in the long lost privilege of buying to specification. Producers who have sold very little or no iron in this market for years are now testing it out with offers and cultivating their former customers.

Not that there are significantly greater tonnages of iron coming into the market. And buying of foreign iron is no longer going on. Nationwide production of iron was at an all-time high in January, but February tonnage dropped by 500,000 tons.

The basic cause of the changed market is the rapid rate at which foundry order backlogs are being eaten into. Foundry customers are simply staying out of the market, expecting to buy later at lower prices. Pressure pipe producers had backlogs totaling 902,545 net tons at the end of January. This figure reflects a drop of 59,000 tons during the month. But the industry is shipping about 100,000 tons a month, indicating that new business is being placed at the rate of only 41,000 tons a month.

Soil pipe manufacturers had backlogs of 184,108 net tons at the end of January. During the month, backlogs were reduced by 51,000 tons. But the industry is shipping only 60,000 tons a month, indicating a new business volume of 9000 tons a month. It is conceivable that by this time the soil pipe backlogs have almost disappeared. Reports in the trade indicate that there are a number of producers who are practically without orders. But this is a seasonal business, and springtime brings in the season.

The gray iron castings industry had backlogs of 2,064,861 tons at the end of January, reflecting a drop of 220,000 tons during the month. As the industry is shipping about a million tons a month, new business represents about 780,000 tons a month. These figures include ingot mold tonnage which will hold up as long as the steel market requires a high ingot rate. Ingot mold shipments in January were 193,000 tons, and unfilled orders at the end of the month were 254,728 tons.

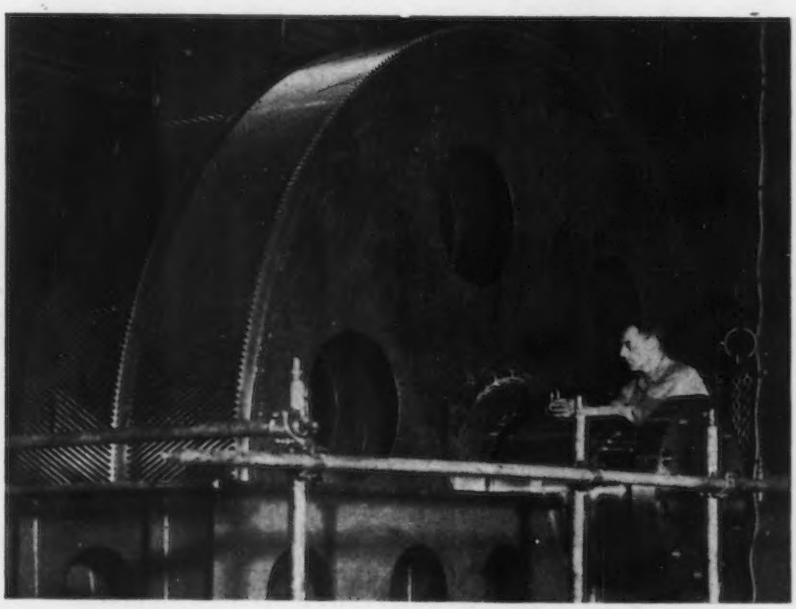
Pig iron producers who are catering now to customers' specifications have been surprised to learn that a good many foundries have dropped their silicon content requirement, compared with prewar buying practice. The most popular silicon range now is reported to be 2.25 to 2.50 pct. In the early days of the shortage, foundries used to ask for 2.75 to 3.00 pct silicon, and seldom were able to get it. Before the war a typical buyer of machine tool castings specified 2.75 to 3.25 pct silicon. Now, iron with not more than 2.00 silicon is desired.

During the shortage of high silicon iron, many foundries learned that they could make good castings by melting a good base grade of iron and alloying with silvery iron or silicon briquets for special requirements. This practice makes it unnecessary to blend for silicon content from 4 to 5 irons, and permits adding as much as 10 pct steel scrap in the charge. Some foundries are out to build up the pig iron charge in order to compete with higher quality castings. An iron-scrap range of 60-40 is a typical objective.

Consumers are very happy at the opportunity to pick and choose their iron, but generally speaking they are sitting back to wait for prices to come down. Producers

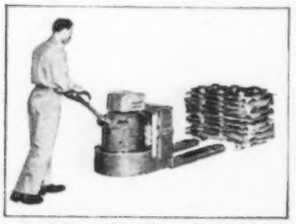
(CONTINUED ON PAGE 161)

SPECIAL GEAR: *A 12,500-hp double-reduction gear set for one of the new supertankers being disassembled prior to shipment at General Electric's Lynn (Mass.) River Works. To insure accuracy, so that gears will function correctly and quietly, temperature is carefully controlled while teeth are being cut. Tolerances on the 35 ton low-speed gear are measured in tens of thousandths of an inch.*



IT'S A NEW TOWMOTOR ELECTRIC HAND-TRUCK

Control handle swings on 200° steering arc.



Forks slide easily under palletized load.

SPECIAL TOWMOTOR
Safety Feature!

Immediately upon releasing the control handle of the Towmotor Model "W" Truck . . .
. . . the spring equipped, self return automatic turn-off switches cut the power supply to the motor.
. . . the heavy duty spring returns the handle to vertical position, instantly applying the positive, quick-acting brake to the drive shaft.
. . . INSURING IMMEDIATE CUT OFF OF POWER AND POSITIVE STOPPING OF THE TRUCK.

Here is the new Towmotor electric pallet hand-truck built to Towmotor's exacting engineering standards. Its compactness, maneuverability and well balanced design make it possible to operate the new Towmotor 25% faster than the average hand truck.* The steering handle is equipped with twin control buttons conveniently located for either right or left hand operation, which enable the operator to guide the truck from any angle. Other Towmotor Model "W" pallet hand-truck features include rapid hydraulic lift, easily detachable forks, positive traction power, 3-point suspension and differential-action trailer wheels. Write today for full information on this and other models in Towmotor's complete line of Fork Lift Trucks and Tractors.

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Procurement Contracts To Contain New Clause

Washington

• • • **All contracts** let by the Army, Navy, or Air Force after July 1 will contain the so-called "nondiscrimination in employment" clause, the Munitions Board has decided.

The Board said its inclusion of the nondiscrimination clause in the new procurement regulations was based on executive orders issued by President Roosevelt.

The standard clause to be inserted in all procurement contracts beginning July 1 is as follows:

"In connection with the performance of this contract, the contractor agrees not to discriminate against any employee or applicant for employment because of race, creed, color, or national origin; and further agrees to insert the foregoing provision in all subcontracts hereunder except subcontracts for standard commercial supplies or for raw materials."

The nondiscrimination clause is set forth in Section XII (Labor) of the Armed Services Procurement Regulation.

Israel Obtains Credit

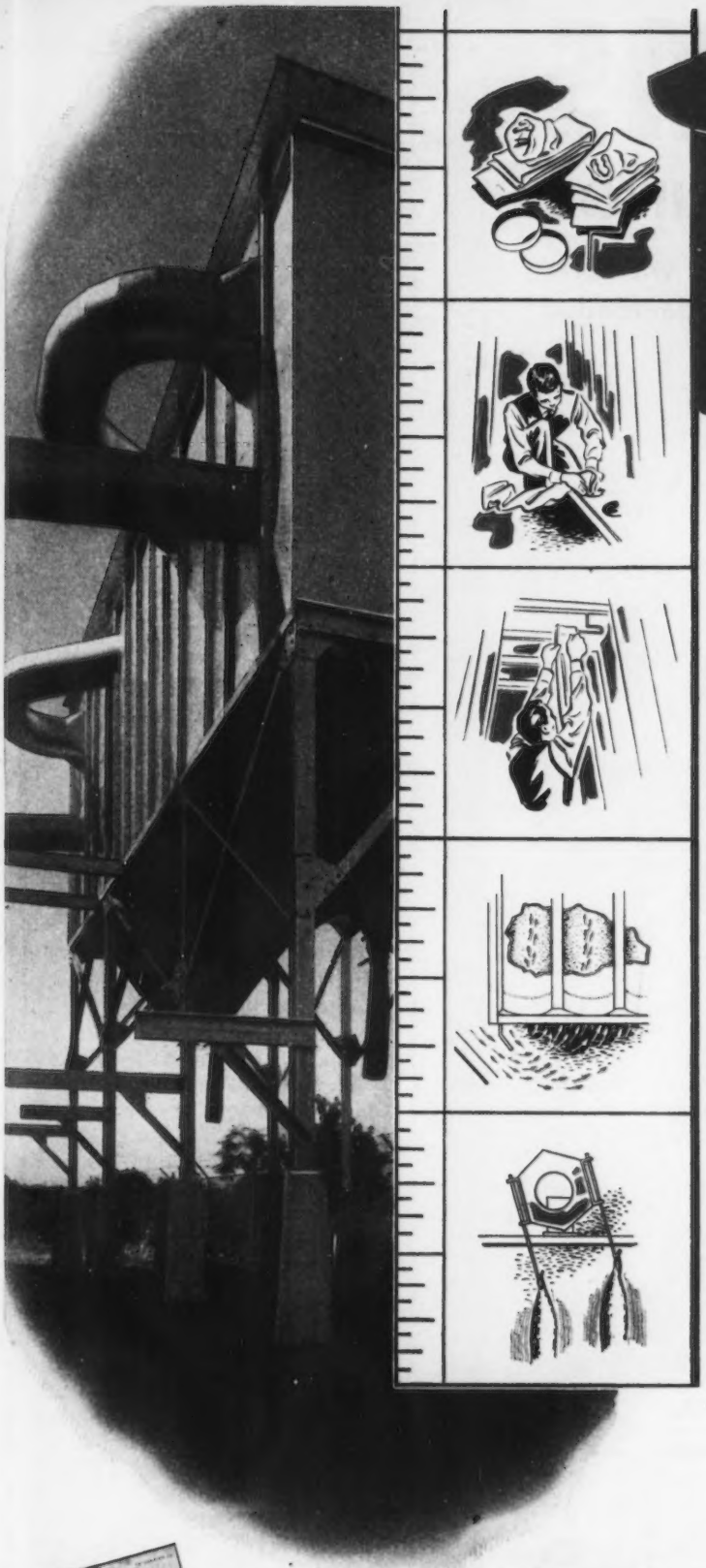
Washington

• • • **The Export-Import Bank** has authorized a credit of $5 million to the State of Israel for the purchase in the United States of structural steel, timber, construction equipment and household fixtures, to be used in the completion of a low-cost housing program on the outskirts of Haifa and Tel Aviv. This credit is an allocation from the $65 million earmarked for financing projects in the fields of transportation, communication, industry and construction.

Sets Ore Output Record

Fontana, Calif.

• • • **A new production** record for iron ore has been established at the Eagle Mountain mine of Kaiser Co., Inc. Initially daily production of ore was estimated at 4000 tons but soon 5000 tons was reached and early this month a record was set of 5598 tons of crushed ore.



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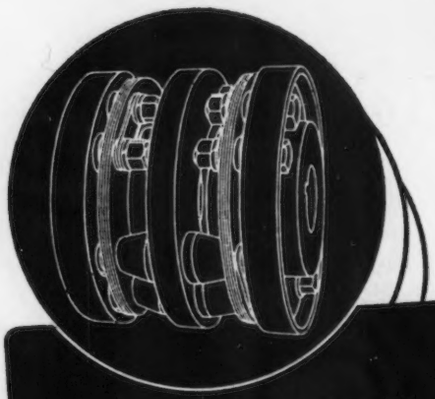

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TYPE DSM

TYPE CM

TYPE ST

TYPE AM

TYPE SS

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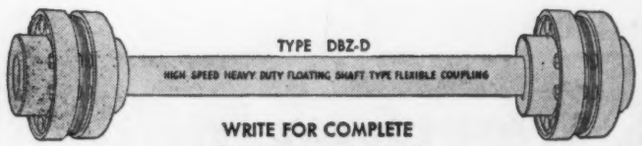
NO LUBRICATION IS REQUIRED!

The Thomas All-Metal Coupling does not depend on springs, gears, rubber or grids to drive. All power is transmitted by direct pull.



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THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA

Dates Are Set For Tool Electrification Meeting at Buffalo

Pittsburgh

• • • **The 1949** Westinghouse Machine Tool Electrification Forum will be held in Buffalo on April 26 and 27. The first day's session will convene in the Niagara Room of the Hotel Statler; the second day's session at the Westinghouse Buffalo plant.

L. A. Liefer, Gisholt Machine Co., Madison, Wis., will open the discussion with a paper on an "Automatic Piston Ring Machine." He will be followed by LeRoy Morrill, Heald Machine Co., Worcester, with a paper on "High-Frequency Systems for Machine Tools." George Levesque, Brown & Sharpe Mfg. Co., Providence, will present a paper on "Bonded Resistance Wire Strain Gauges as Components of Machinery and Gauge Equipment."

Following a recess, Mr. Alcorn of the Chambersburg Engineering Company, Chambersburg, Pennsylvania, and Mr. D. G. Hatchard, Westinghouse, will conclude the morning session with a paper on "R-F Heating of V-Ways."

After a luncheon in the Fillmore Room of the Statler, an open forum discussion will be led by D. W. McGill, Westinghouse. R. H. Clark, Warner & Swasey Co., Cleveland, E. J. Rivoira, Cincinnati Milling Machine Co., Cincinnati, and John Doran, D. A. Gray Co., Cincinnati, will assist in the discussion.

A report of the NMTBA electrical committee will be given by its chairman, W. B. Wigton, Cincinnati Planer Co., Cincinnati.

The second day's session will be held at the Westinghouse Buffalo Works, with transportation provided to and from the hotel. L. R. Ludwig, manager of the Westinghouse Buffalo divisions will welcome the guests. He will be followed by E. H. Vedder, Westinghouse, who will demonstrate the Adjustable Voltage AV Drive. D. E. Herr, Westinghouse Transformer Div., will present a paper on a "Machine Tool Control Transformer." "Electrical Braking for Induction Motors" will be presented as a paper by L. W. Herchenroeder, of the Westinghouse Industry Engineering Dept.

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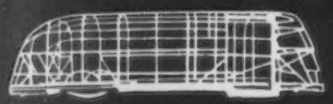

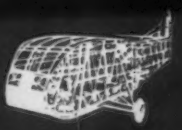

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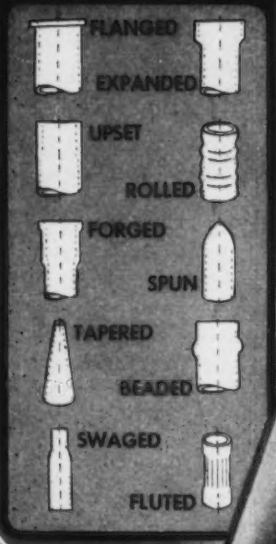

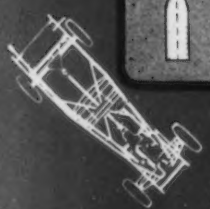

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MICHIANA STAINLESS STEEL CASTINGS

The morning session will conclude with a paper on "Adjustable Speed Saturable Reactor Drive," by J. E. Priest, Westinghouse Motor Div.

After luncheon an inspection of the plant will be made, followed by an open discussion of the trip.

The forum will conclude with a dinner in the ballroom of the Statler, at which Tell Berna, general manager NMTBA, will speak.

Construction Pace Leads Rate of Previous Year

Washington

• • • **Despite the** seasonal downtrend which dropped February construction to $1.1 billion, the total for the first 2 months amounted to $2.4 billion—11 pct more than for the same 2 months last year. A substantial portion of the February decrease was in highway work.

And while construction employment for February declined by 113,000 to a total of 1,793,000 workers, building trades employment was still 60,000 more than for the same month last year.

Residential construction was down by 13 pct to $425 million for February with early figures indicating that 46,000 new dwelling units were started during the month—4000 under January and about the same number under a year ago.

For the month, production of building materials continued to increase and showed a gain of 5 pct over 1948. Output of soil pipe hit an all-time high and nail production was highest since 1925.

Profits Hit All-Time High

Detroit

• • • **Consolidated net** income of $13,225,923 or $7.28 per share has been reported by Hudson Motor Car Co. for the year 1948.

Hudson's 1948 earnings represent 4.81 pct of net sales, which totalled $274,728,638.

According to A. E. Barit, president and general manager, Hudson's sales volume during 1948 of 142,454 cars is 38 pct ahead of the 1947 total. During a final quarter of 1948, Hudson's shipments were 71 pct over the average for the first three quarters.

FLASH-BUTT WELDED RINGS and BANDS *by* AMERICAN WELDING

Flash-butt welded rings and bands . . . both carbon and alloy . . . prove to be superior. Records show that there is a substantial

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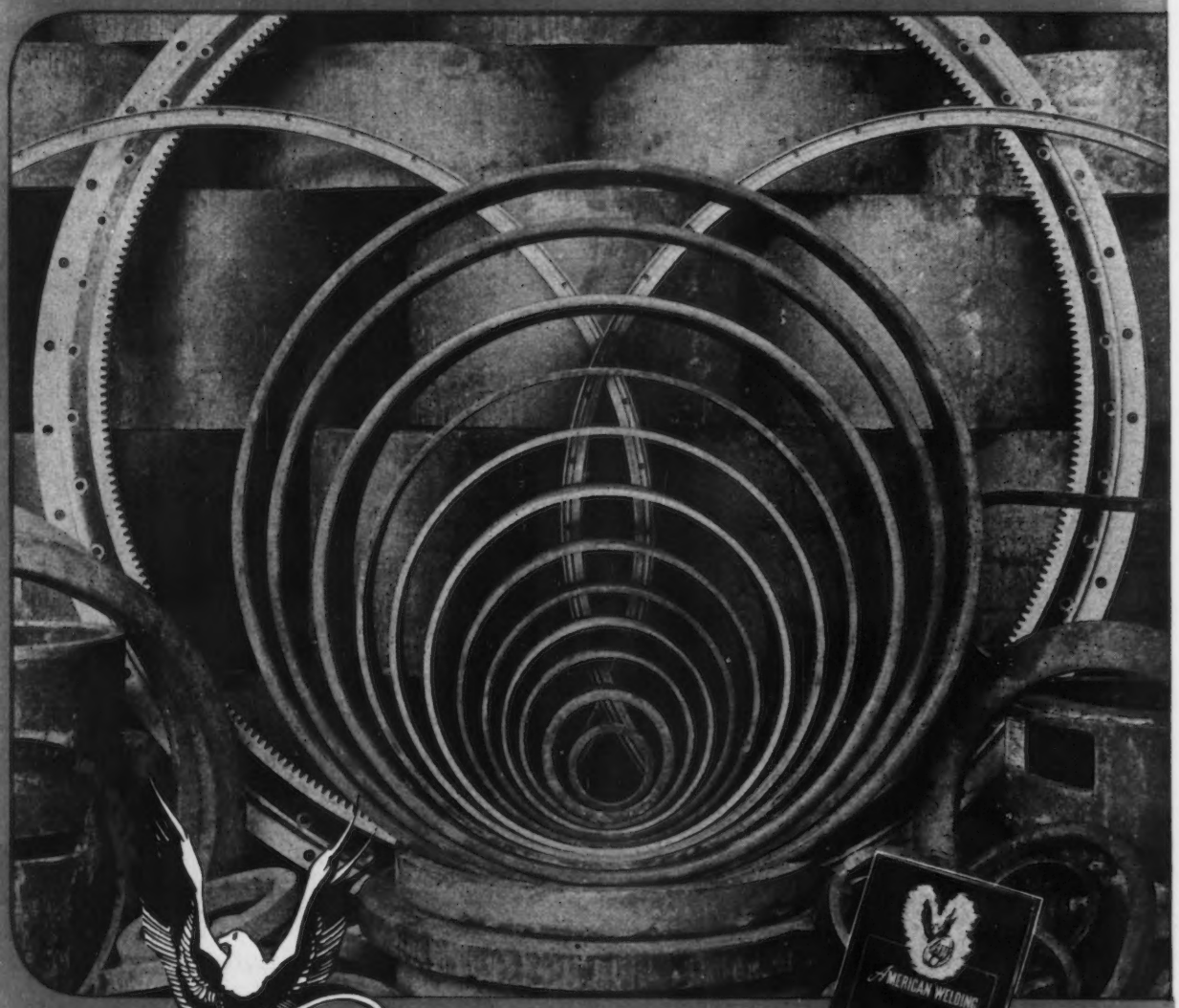
If you use rings, bands, or any other welded product, send your specifications, quantity, and prints for prompt quotation.



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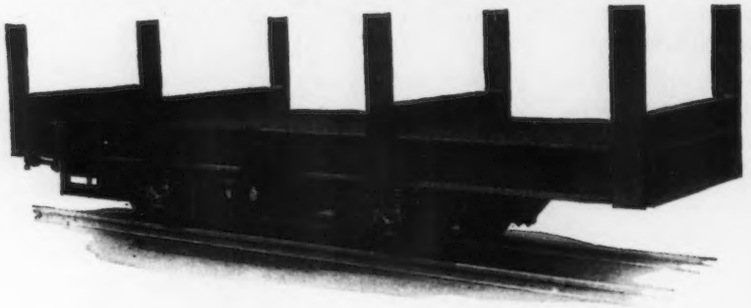
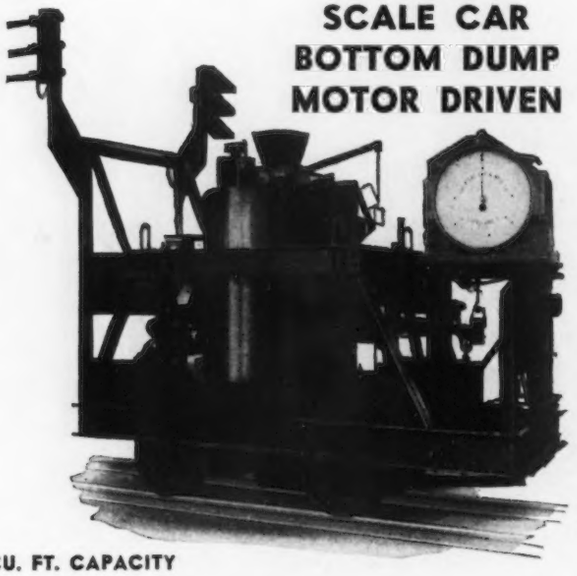
10 TON STORAGE BATTERY FLAT CAR



Built for handling pipe and conduit. Powered by storage battery. Geared to travel at walking speed when controller is held in operating position. Automatic "shut-off" and brake applied when spring return handle of the controller is released.

ELECTRIC SCALE CAR BOTTOM DUMP MOTOR DRIVEN



36 CU. FT. CAPACITY

For use in chemical plants. Cylindrical type body with dust filter. Mounted on Atlas Scale with 24" Atlas Dial and type-printing recorder. Car equipped with brakes, levers for operating discharge and loading chutes.

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Regional Conference AIME&ME, Metals Div., Scheduled for Apr.

Springfield

• • • **Seven technical papers**, a trip through 2 plants in the metalworking field and a formal dinner will feature the third annual meeting of the New England Regional Conference, Institute of Metals Div., AIME&ME, at the Sheraton Hotel, Springfield, Mass., Friday and Saturday, Apr. 22 and 23. Technical papers will be read Friday afternoon and Saturday morning, the first session to feature a variety of topics while the latter seminar session to be devoted to high temperature materials with 3 papers.

The plant visitations will occur Friday morning to the Chapman Valve Mfg. Co. and to the American Bosch Co., arrangements being in the hands of G. E. Fox, works manager, Chapman Valve Mfg. Co., and Howard Boyer, chief metallurgist, American Bosch Co. The main speaker at the banquet Friday night will be Dr. A. B. Kinzel, president, Union Carbide & Carbon Corp., on "Research, the Foundation of the Metal Industries of New England."

For the Friday afternoon technical session W. H. Sharp, Pratt & Whitney Aircraft, East Hartford, Conn., will serve as chairman. The following papers will be given: "The Influence of Composition on the Stress Corrosion Cracking of Some Copper Base Alloys," by A. W. Tracy and D. H. Thompson, both of the American Brass Co., Waterbury, Conn.; "The Gaseous Fluxing for Brazing of Steel," by Alden Edson, Hamilton Standard Propeller Div., United Aircraft, East Hartford, Conn.; "The Properties of Commercially Pure Titanium," by W. L. Finlay and E. L. Wemple, Remington Arms Co., Bridgeport, Conn.; and "Solid Phase Bonding of Aluminum to Steel," by V. W. Cooke, Pratt & Whitney Aircraft.

In charge of the Saturday forenoon technical session will be Norman Mochel, Westinghouse Electric Corp., East Philadelphia. The following papers are to be presented: "Alloys for High Temperature Service," by R. H. Thielemann, United Aircraft Co., Pratt

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YES, hundreds of fastening ideas that can lead to outstanding savings in assembly costs are contained in the Tinnerman Handbook of Fastenings. It has been created especially for designers, engineers, production and management executives. Takes only 25 minutes to review . . . 25 minutes you may find very worthwhile! *Here's a partial list of contents:*

Page after page of parts drawings and detailed photographs of actual applications classified by type . . . significant case histories on SPEED NUT savings . . . and details on the Tinnerman Fastening Analysis Service.

It contains all the data about the amazing SPEED NUT brand of fasteners that are helping a top-ranking car manufacturer save an estimated 3 million dollars this year . . . that cut assembly time 30% for another company . . . that saved $50,000 in equipment investment for still another.

If you're interested in seeing this guidebook of fastenings, call your Tinnerman representative—listed in major city phone directories—or write: TINNERMAN PRODUCTS, INC., 2040 Fulton Rd., Cleveland 13, O.

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A steel supply company faced the handling problem of unloading sheet stock, bar stock and pipe from box cars, storing it in special racks, and loading it onto highway trucks for delivery to its customers. Even with a lift truck, much manual handling was required.

The problem was solved with a Baker 2-ton Crane Truck, which quickly and easily unloads material from box cars to a point where it can be handled by overhead crane. The Baker Truck also facilitates placing material in racks (as shown) and loading highway trucks. Its use has effected savings of 30% handling light stock, and 75% for heavy stock.

A Baker Material Handling Engineer can show you how similar savings are possible in your plant.

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& Whitney Div.; "Sigma Phase in Cast Austenitic Steels," by Sidney Low, Chapman Valve Mfg. Co., Indian Orchard, Mass.; "High Temperature Research," by Ernest Robinson, General Electric Co., Schenectady, N. Y.

Three combinations of fees have been provided, as follows: banquet, transportation for plant visitations and registration, $5; banquet and registration only, $4; registration fee only $2.

Production Increased For Dynaflow Units

Detroit

• • • **The growing** popularity of automatic self-shifting transmissions is attested again by the report that in the first full year of production, Buick has built a total of 125,000 units.

At the present time Buick is producing about 1100 units daily. For the month of Mar. production schedules call for an output of more than 25,000 Dynaflow units, the greatest single month since the new torque converter transmission was put in production during Feb. 1948.

According to Ivan L. Wiles, general manager of Buick, approximately 80 pct of all Buick cars are now being equipped with Dynaflow.

Buick officials disclosed that since the introduction of Dynaflow transmission last year, the company facilities have been trebled.

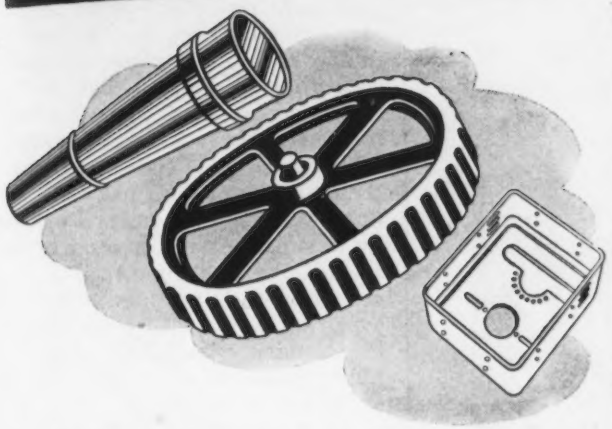
Acquires New Property

Hammond, Ind.

• • • **Allied Structural Steel Co.** of Chicago has bought the east portion of Plancor 1789 formerly used as WAA Disposal Center No. 6 in this city. Allied paid $475,000 for property which includes 28 acres of land, and one large building. The building contains approximately 313,000 sq ft of floor space.

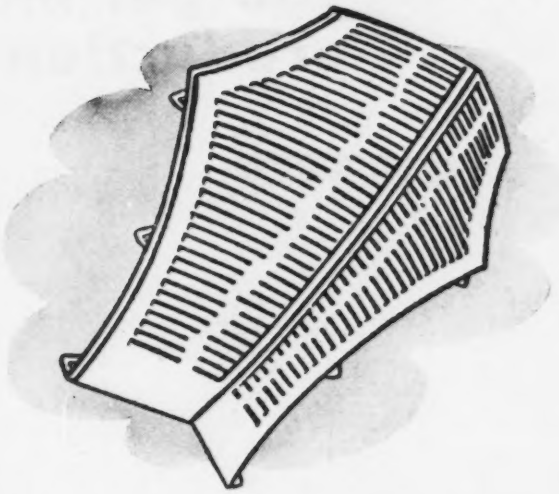
The building is equipped with electric overhead cranes of various sizes and has a complete overhead dry type sprinkler system. Allied took possession of the property Mar. 15 and will use the facilities for the fabrication of steel and eventually plan to employ about 300 persons in the plant.

Vapor Degreasing thoroughly removes grease and oil



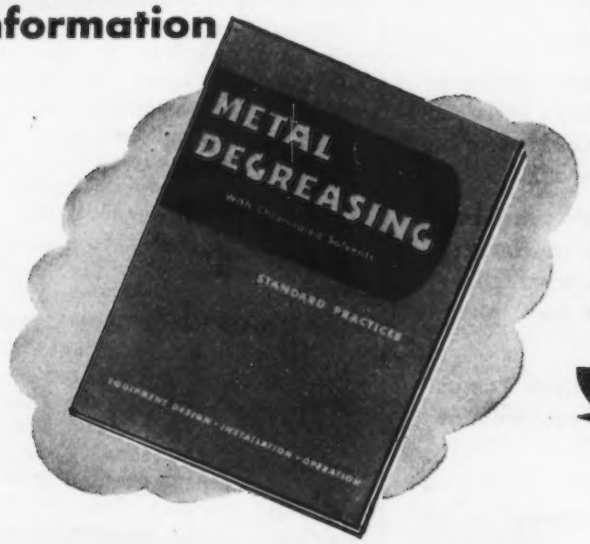
IN ONE OPERATION, often in less than one minute, this economical cleaning method removes all traces of grease and oil from metal parts of any size or shape—plastics, glass and many other materials. It can save time and cut costs in large and small plants because it speeds production and cleaning.

reaches almost inaccessible places . . . reduces risk of damage



VAPOR DEGREASING reaches deep draws, holes and almost inaccessible places. It reduces the risk of damage to small, delicate parts . . . makes possible more accurate inspections during machining operations or assembly. And it renders parts clean, warm and dry—ready for the next operating step.

This book gives full information



"METAL DEGREASING—STANDARD PRACTICES" tells you how to carry out Vapor Degreasing safely and economically. It shows why the results obtained with this method can't be matched. It shows typical compact, scientific equipment, which is available for efficient and economical operation. And it gives information about solvents used in this equipment—Du Pont Trichlorethylene and Perchlorethylene—which under various trade marks have been widely used for many years. Send for it today!

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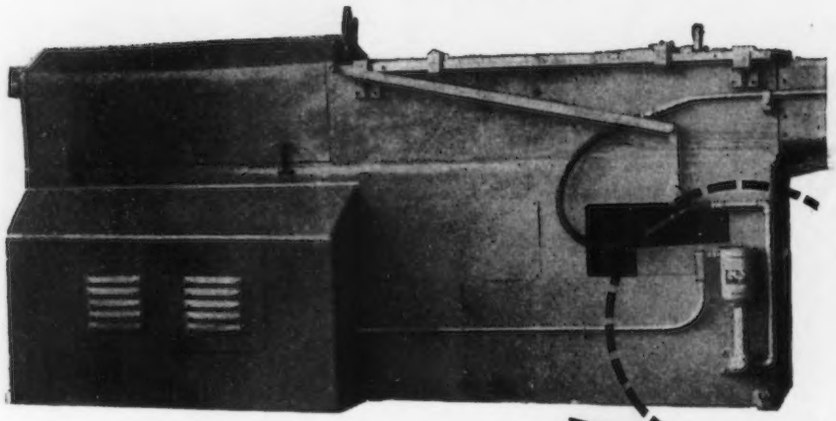

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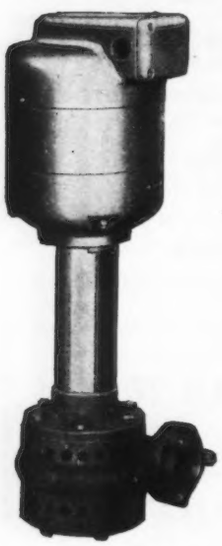

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Simple construction, oversized pre-lubricated ball bearings requiring no further lubrication, electronically balanced shaft assembly insures long trouble-free pump life with low maintenance costs.

So specify Ruthman Gusher Coolant Pumps on your machines for more production at lower cost.

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1821 Reading Road — Cincinnati, Ohio

Says Steel Expansion Would Cost Too Much; Infers Price Too Low

New York

• • • **Proposals for** expanding the steel industry, even to the extent of nationalization, are based on faulty and incomplete analysis, according to Marvin Barloon in the March number of the *Harvard Business Review*. In his article, "The Question of Steel Capacity," Mr. Barloon, chairman of the Business and Economics Dept. of Western Reserve University, examines the underlying issues involved in the present controversy over the shortage of steel and its inflationary effect, and comes to the conclusion that steel is, if anything, underpriced.

Mr. Barloon does not doubt the present need for more steel production. But he does raise the question whether "the country's need for a bigger steel industry" would "benefit the country more than it would cost." It is in this connection that he calls attention to the fact that "the demand for a bigger steel industry has become a move toward partial nationalization." He is referring, of course, to the Administration's proposals for the federal government to construct its own steel plants in the event that the steel industry "proves unyielding" and does not take advantage of RFC loans "for expansion of plants to a size now deemed imprudent by most of the steel executives."

He agrees that "the consumption of steel is now higher than in the past and that future requirements may be even greater." But, despite the fact that "quite conceivably the American economy has outgrown its steel capacity," he warns against too great reliance on trend analysis, based either on present demand with an abnormal backlog from wartime shortages or on prewar rates of growth. He points out that the continuously increasing demands for steel in the past were brought about by the growth of whole new industries—such as railroads, automobiles, electrical manufacturing—yet there is no sure indication that new industries using steel will continue to develop at the same rate in the future. There is danger, instead, that once the

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When work comes up that finds you short of what you need, that's the very best time to call Wolff Metal Service . . . for Wolff is geared to be responsive to the urgency that *moves you*. Here is a warehouse group that is alive, elastic and full of bounce; an organization that has plenty of system but no red tape; one that has been trained to regard "routine work" as the fastest route an order can take to reach your unloading dock.

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backlog of demand for steel has been supplied, the demand will begin to decline.

A more reliable reason for expansion, to Mr. Barloon's mind, is the possibility that the steel shortage may be contributing seriously to inflation, "and, if so, are depression and crisis to follow as a delayed reaction?" He cites the limiting effect on production in other industries using steel directly or indirectly, with the consequence that the shortage may be responsible for carrying "prices and speculation in hundreds of thousands of commodities to distorted levels."

He finds, however, that this reason for expansion has lost much of its force by now. "At the beginning of 1949, there are many indications that the inflation has about run its course, so that, as far as steel expansion is concerned, there appears to be little more inflation to prevent. If there is to be a stabilized or gradually declining price level and a diminishing demand for steel from 1948 on, we shall certainly not be fighting inflation by beginning in 1949 to build up the steel industry."

Mr. Barloon ascribes the reluctance of the steel executives to the fact that "the profit prospects are not good enough to warrant" further expansion. This is in his mind a sound motive, but he feels they are at fault in not presenting their case to the public consistently or fully.

The assumption seems correct, Mr. Barloon states, "that the steel industry is now unable to attract sufficient private capital for further major expansion. Even under its present operating structure, earnings on investment in steel stocks are not competitive in the money markets. For the first 9 months of 1948, profits in the steel industry ran at 12.6 pct of owners' investment, the lowest rate of 14 major manufacturing groups reported. For the year 1947 the rate of return was 11.3 pct, placing the industry in the forty-third position out of forty-five manufacturing groups—just about the worst from the investor's point of view.

"The trouble with the steel industry's rate of return on investment is that its product is underpriced. Of course, in considering earnings one has to consider costs

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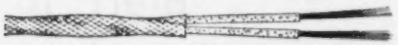

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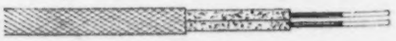

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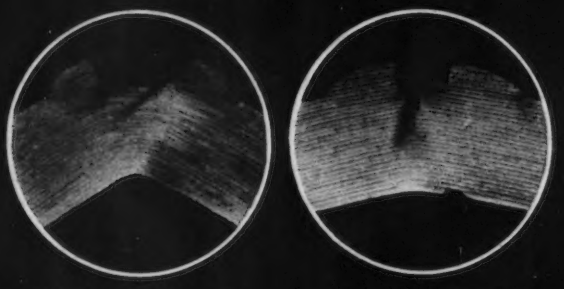
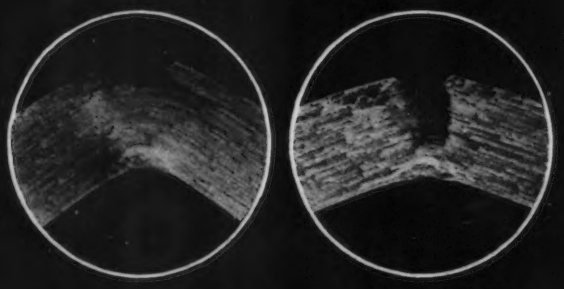
Saw-Cut notch prior to bending



MANGANESE TITANIUM — HIGH STRENGTH PLATE

V-Notch machined prior to bending



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along with prices, and steel company officials have made much of increases in production costs. But in this respect steel is not to be unfavorably distinguished from other industries. If anything, because of the high degree of integration, including the ownership of raw material sources and of lake carriers and railroads, the steel industry has been in a position to combat rising raw material prices and transportation costs better than most other industries."

Chrysler Earnings Jump

Detroit

• • • **Net earnings** of Chrysler Corp. for 1948 amounted to $89,187,240 compared with $67,181,221 in 1947.

Dollar sales volume of Chrysler Corp. including cars and trucks, parts, accessories and other products was at an all-time high of $1,567,933,360.

The number of passenger cars and trucks sold by U. S. and Canadian plants totaled 1,064,759. This volume has been exceeded only in 1937, 1940 and 1941.

In 1948 Chrysler used $1,024,379,965 worth of materials, parts, and services and paid out $289,097,300 in salaries and wages. Dividends aggregated $34,809,056. Total taxes paid were $150,487,145, the report said.

Chrysler officials justified the recent price increase on the grounds that no significant drop in labor costs or prices of material is as yet in prospect.

Republic Steel Dividend

Cleveland

• • • **Directors of** Republic Steel Corp. declared Feb. 15 a regular dividend of $1.50 per share on the 6 pct cumulative convertible prior preference stock, Series A, payable Apr. 1, 1949, to stockholders of record March 10, and regular dividend of 25c per share on the common stock of the corporation, payable Apr. 2, to stockholders of record March 10.

The board also declared an extra dividend of 25c per share on the common stock, likewise payable Apr. 2, to stockholders of record March 10.

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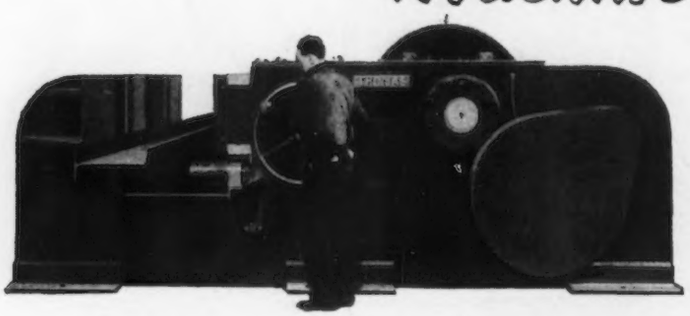

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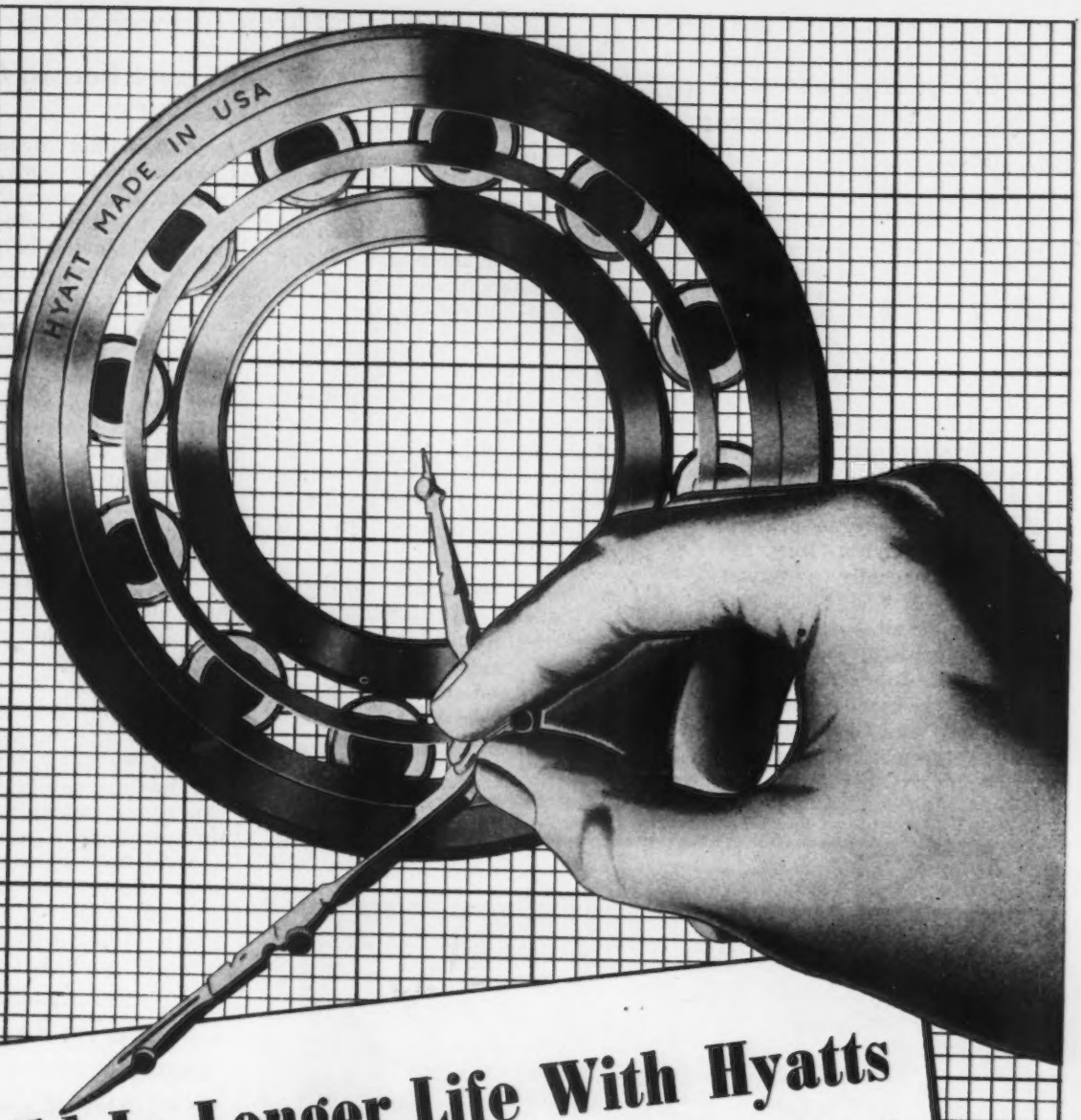

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HYATT ROLLER BEARINGS

New Report Emphasizes Safety With Explosives

Washington

• • • **Most accidents** caused by liquid-oxygen explosives — used chiefly in open-pit mining in the United States—are blamed on the failure to provide and abide by safety regulations for handling this type of explosive, according to a bulletin released by the Bureau of Mines.

Commonly identified as "LOX", these explosives are prepared by soaking carbonaceous absorbents such as lampblack and carbon black in liquid oxygen of better than 99.5 pct purity. Detonation is effected generally by electric blasting caps. The bulletin describes the results of a cooperative survey made by the Bureau of Mines and the Linde Air Products Co., N. Y., designed to establish test methods and investigate performance characteristics of liquid-oxygen explosives.

Fire danger is the main hazard associated with the use of LOX, as compared to fixed explosives, the Bureau report discloses. This arises from both the high inflammability of the explosive and the presence of free oxygen which accelerates the combustion of any burning material and the ignitibility of combustible gases.

Results of the survey and test procedures, which are expected to provide a guide to the manufacturers and users of LOX, were compiled by W. E. Tournay and F. M. Bower, cooperative investigators, and F. W. Brown, former physicist, Explosives Branch, Bruceton, Pa.

Copies of the report, Bulletin 472, "Safety and Performance Characteristics of Liquid-Oxygen Explosives," may be obtained from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., for 30 cents each.

Reports Record Earnings

Cleveland

• • • **Cleveland Graphite Bronze** Co. earned net profit of $3,063,394 in 1948, highest in the company's history, Ben F. Hopkins, chairman, and James L. Myers, president, reported to stockholders. Net profit in 1947 was $2,903,557.

Sales in 1948 were $29,277,979, compared with $30,543,648 in 1947. Other revenues were $367,229, compared with $517,369 in 1947. After payment of $101,370 in preferred dividends ($5 a share) and $1,158,912 in common dividends ($1.80 a share) the remainder of $1,803,112 was added to reinvestment of profit.

"Our business is excellent in the first quarter of 1949 and we expect it to continue at satisfactory levels in the second quarter," the report stated. "A general feeling exists in the automobile industry that 1949 will be a good year, although we know that changes in the buying habits of the public can occur suddenly and with little warning. There is, however, general apprehension of the possible effects of certain proposals of the Federal Administration which, if carried out, could influence all industry most unfavorably."

Change Tin Restrictions

Washington

• • • **Lifting of special quota** restrictions on the amount of tin which may be used in making beer and animal food cans is included in changes in the Commerce Dept.'s order M-81, effective Mar. 14. The changes do not alter existing limitations on use of tin in overall can manufacture, however. These still provide that during the first half of 1949 manufacturers may not use more than 50 pct of the tin in the form of tinplate coating "than was contained in the tinplate received during 1947 for making cans."

Other amendments to M-81 permit: (1) Use of quarter-pound tinplate for nonsoldered parts of cans for certain food products, previously prohibited. (2) use of quarter-pound tinplate in coffee cans, smaller than 2-lb size, and (3) inclusion of scallops on the list of fish products which may be packed in tin cans.

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Postpone Action on Power

Washington

• • • **Action on** New York State's proposal to develop a portion of a cooperative international power project on the St. Lawrence River has been postponed by the Federal Power Commission pending reconsideration by Congress of the overall St. Lawrence Seaway Project.

The Power Authority of the State of New York filed an application in July, 1948, for an FPC license authorizing the project. Under the plan, New York would construct the portion of the project lying on the U. S. side of the International Rapids Section of the St. Lawrence, and the Hydro-Electric Power Commission of Ontario, Canada, would build the part on the Canadian side. The FPC held hearings on the application in Washington, D. C., last October.

FPC's statement that action on the application would be "held in abeyance" was made in connection with an order in which it dismissed a petition by the National St. Lawrence Project Conference to reopen the proceeding for additional evidence. The National St. Lawrence Project Conference, which is opposing the state's application, is a limited participant in the proceeding.

Defer Wage Negotiations

Milwaukee

• • • **Wage negotiations** between the United Steel Workers and the Harnischfeger Corp., have been geared to follow similar negotiations between the U. S. Steel Corp. and its workers. On Feb. 13, United Steel Workers Local 114 signed a new contract with Harnischfeger which will permit the union to delay wage negotiations with the company each year until after the United States Steel Corp. has settled with Phil Murray's union.

In the past wage negotiations at Harnischfeger have always been hampered by the fact that the Harnischfeger contract came up shortly before Big Steel negotiations. Because of this, both the union and the company were somewhat at a disadvantage because they had to attempt to guess what the Corporation's settlement would be.

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GE Sales Up 13 Pct in '48

Schenectady

• • • **General Electric Co.** and its consolidated affiliates did a record volume of business in 1948, the sales billed to customers having totaled $1,632,700,000 or 13 pct more than in the previous peak wartime year of 1944 and 23 pct more than the $1,330,800,000 billed in 1947, according to Charles E. Wilson, G-E president.

The net profit earned during 1948 amounted to $123,835,000 compared with the previous record earnings of $95,299,000 in 1947, equivalent to $4.29 and $3.30, respectively, on each share of common stock. Of the amount earned in 1948, 58.5 pct, or $72,449,000, was reinvested in the business. Dividends of $51,386,000, or $1.80 a share, were declared on common stock. Dividends declared in 1947 totaled $1.60 a share.

Elected New Chapter Head

Detroit

• • • **William H. McGaughey,** has been elected president of the Detroit chapter, Public Relations Society of America. McGaughey is public relations director for the Automobile Manufacturers Assn. He succeeds Calvin W. Patterson, vice-president of the Michigan Bell Telephone Co., as head of the Detroit group.

Other officers of the Detroit chapter include: William G. Haworth, Nash-Kelvinator, as vice-president; LeRoy Cowles, General Motors Corp., secretary; and Edwin J. Smith, Borden's Farm Products Co. of Michigan, treasurer. Otis Crosby, Detroit Board of Education is chairman.

Batteiger Gets PMI Post

Philadelphia

• • • **Mr. R. L. Batteiger,** president, Coatesville Plate Washer Co., has been elected district chairman for 1949 of the Philadelphia district Pressed Metal Institute. Mr. Batteiger will also become a member of the PMI board of trustees.

Mr. Walter A. Gorrell, president, E. J. McAleer & Co., who was chairman of the Philadelphia District retains his post as vice-president.

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Thomas Steel Earnings

Warren, Ohio

• • • **Net sales of** $11,564,865 are reported by the Thomas Steel Co. in its 1948 Annual Report to stockholders. After payment of federal taxes, this amount represents net earnings of $1,801,146 as compared with the 1947 net of $1,688,858, earned on a slightly larger sales volume.

After payment of preferred stock dividends, 1948 earnings amounted to $5.10 a share on outstanding common stock, compared with $4.75 per share of common earned in 1947.

Common stock dividend payments totaled $2.35 per share, establishing an all-time record for the 23 consecutive years in which the company has paid cash dividends. 1790 shares of preferred stock were purchased and retired during the year, and $438,740 was invested in new plant additions and equipment. An additional $500,000 has been authorized for further modernization and expansion.

In discussing the coming year's prospects, E. Milton Barber, president, says, "It is impossible to forecast 1949 sales with any degree of certainty, but reactions of customers and orders on hand would indicate no slackening of demand for the first 6 months of the year. The outlook for the latter half is less certain. We have received no indications from customers that would lead us to anticipate a serious decline, but we are well aware of the fact that the outlook can change radically at any time."

Record Electric Output

Washington

• • • **A net increase** of more than 300,000 kw in installed capacity enabled electric utilities to produce a new high in electric energy output for January—25,570 billion kwh.

Addition of the new capacity brings the industry's total to 56.8 million kw, which is now producing power at an annual rate of nearly 285 billion kwh. This represents 10 pct more power than for 1947.

Water power plants now produce about a third of total production, and production by private industry, including railroad plants, produces about 17 pct.

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MACHINE TOOLS

. . . News and Market Activities

Toolmakers Scan Plan to Ship Surplus Tools to Western Europe

• • • **A plan to make** available U. S. surplus machine tools including, presumably, the Joint Army-Navy Machine Tool Reserve (JANMAT) to the 16 ECA nations for their machine tool requirements and the replacement of the inventories through granting additional contracts to U. S. machine tool builders has been proposed by Congressman James T. Patterson (R., Conn.). Congressman Patterson has also requested of the Joint Congressional Committee on ECA that representatives of the machine tool industry be allowed to testify before it on the effect of the present restrictions in ECA policy.

"The present provisions of the (ECA) act, under which commodities such as machine tools must be purchased from participating countries, has resulted in almost total exclusion of exports for the U. S. machine tool industry," Congressman Patterson declared.

Meanwhile, he reported an exchange of correspondence with ECA Administrator, Paul E. Hoffman, in which the congressman suggested that surplus machine tool inventory in this country be made available to the 16 ECA nations. This inventory, Congressman Patterson said, could subsequently be replaced through granting additional contracts to American machine tool builders.

This, he pointed out, might alleviate the present dislocation of the industry and help maintain the skilled labor force which would be necessary in any future national emergency. England and other nations now engaged in producing machine tools for export might thus concentrate on their own domestic needs, he said, and idle machinery in this country could be used for European recovery.

In reply, Administrator Hoffman told Congressman Patterson that ECA had surveyed surplus inventories of machine tools and found they provided little in the way of usable tools or machinery due to priorities existing under the armed service stockpiling program.

Mr. Hoffman said ECA had investigated the possibility of tapping the JANMAT inventory for use in the European Recovery Program and found that current laws make no provision for their release outside the domestic economy.

"It would require a changed policy on the part of the military establishment, not ECA, and possibly a change in existing legislation before this machine tool inventory could be made available to the participating countries," Mr. Hoffman wrote.

At least one firm, the Hendey Machine Co., Torrington, Conn., has advised the congressman that a serious unemployment situation has resulted because of the firm's inability to produce for export. Hendey officials have depended on exports for 20 pct of the plant's production, Congressman Patterson stated.

In asking the ECA "watchdog committee" to consider changes in the present program, Congressman Patterson said officials of local 398 UAW-CIO and the Hendey Co. feel "cogent argument" can be presented for administrative revisions which would put them back in the export business.

In Detroit, the machine tool market continues spotty but promising. Purchases by Pontiac and Buick have been reported the past week. It is believed this equipment will be used for the 1950 engine program. Another development of possible consequence is the reported shipping of equipment for the new Chevrolet automatic transmission to the Cleveland plant. Some sources interpret this to mean that the new transmission will be built in Cleveland rather than at Saginaw.

The new Dodge program, reported several weeks ago, appears to be temporarily at a standstill. There have been no indications of significant changes during the past week on pending automatic transmission programs by firms other than General Motors.

In Cleveland, Warner & Swasey Co. operated at a profit in 1948 for the first time since the end of the war, reporting net income of $573,041, compared with an operating loss of $297,387 for 1947 and a similar operating loss of $162,109 for 1946.

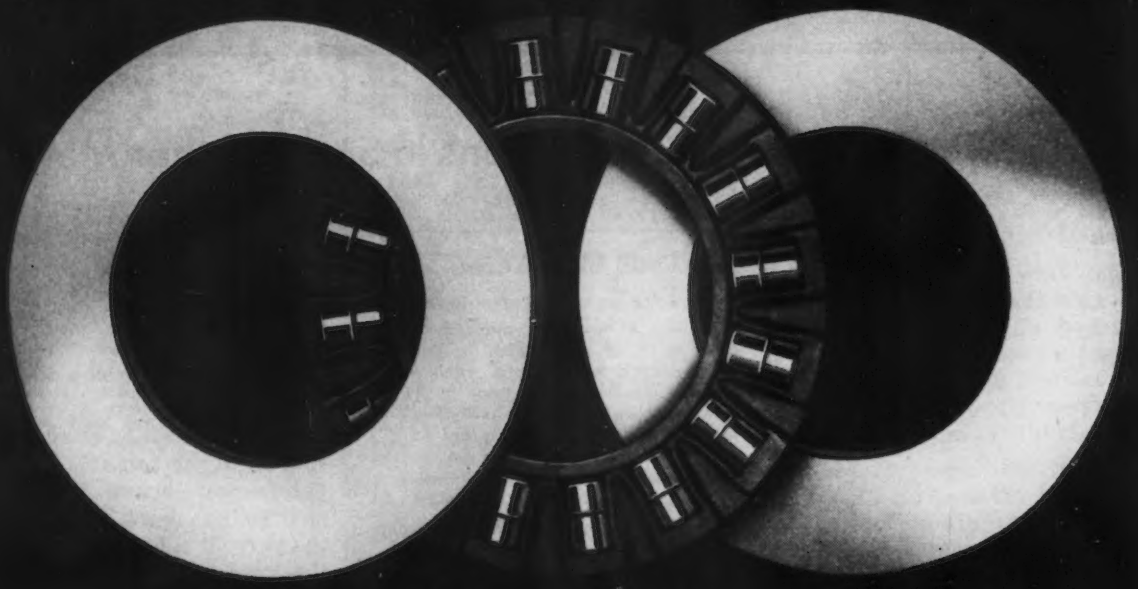
Sales of all products in 1948 totaled $18,775,061 compared with $14,705,571 for 1947. Machine tool sales totaled $11,870,048 for 1948 compared with $10,141,742 in 1947, despite the fact that machine tool industry's 1948 sales volume declined. Warner & Swasey sold 4 pct of the total machine tool industry sales in 1948, compared with 3.3 pct in 1947.

"In 1948," Charles J. Stilwell, president of the company, stated, "we succeeded in increasing our volume of machine tool sales over the previous year in contrast to the machine tool industry in general. In addition, we realized a substantially larger volume of production on products other than machine tools. Sales of new products were supplemented by contract work, which helped to carry the burden of overhead until such time as new products utilize full capacity.

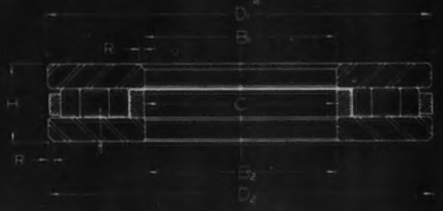
"While machine tools continue to remain the bread and butter product of our company, the following sales comparison is nevertheless significant:

Year	Machine Tools	Products Other Than Machine Tools
1946	$13,631,751	$1,812,818
1947	10,141,742	4,563,829
1948	11,970,048	6,905,013

KAYDON TYPE RT THRUST ROLLER BEARINGS



STRAIGHT ROLLER TYPE
FLAT RACES
TYPE RT



SIZES AS LISTED
CARRIED
IN STOCK

Bearing No.	Sizes and Dimensions • See Drawing Above						Roller Diam.	R 45° Chamfer	Lbs. †Capacity at 100 R.P.M.
	B_1	B_2	C	D_1	D_2	H			
RT-26	2.002"	2.015"	2.010"	5.968"	6.000"	1.375"	½"	.062"	36,000
RT-27	2.002	2.015	2.010	6.968	7.000	1.375	½	.062	48,300
RT-28	2.002	2.015	2.010	7.968	8.000	1.375	½	.062	65,400
RT-36	3.002	3.015	3.010	5.968	6.000	1.375	½	.062	**29,800**
RT-37	3.002	3.015	3.010	6.968	7.000	1.375	½	.062	**43,600**
RT-38	3.002	3.015	3.010	7.968	8.000	1.375	½	.062	55,600
RT-39	3.002	3.015	3.010	8.968	9.000	1.375	½	.062	67,500
RT-47	4.002	4.015	4.010	6.968	7.000	1.750	⅝	.062	**34,700**
RT-48	4.002	4.015	4.010	7.968	8.000	1.750	⅝	.062	**54,600**
RT-49	4.002	4.015	4.010	8.968	9.000	1.750	⅝	.062	**69,400**
RT-410	4.002	4.015	4.010	9.968	10.000	1.750	⅝	.062	89,300
RT-58	5.002	5.015	5.010	7.968	8.000	1.750	⅝	.062	40,300
RT-59	5.002	5.015	5.010	8.968	9.000	1.750	⅝	.062	63,300
RT-510	5.002	5.015	5.010	9.968	10.000	2.000	¾	.125	83,300
RT-511	5.002	5.015	5.010	10.968	11.000	2.000	¾	.125	111,600
RT-512	5.002	5.015	5.010	11.968	12.000	2.000	¾	.125	136,300
RT-69	6.002	6.015	6.010	8.968	9.000	2.000	¾	.125	48,300
RT-610	6.002	6.015	6.010	9.968	10.000	2.000	¾	.125	76,000
RT-611	6.002	6.015	6.010	10.968	11.000	2.000	¾	.125	100,100
RT-612	6.002	6.015	6.010	11.968	12.000	2.000	¾	.125	124,300
RT-710	7.002	7.015	7.010	9.968	10.000	2.000	¾	.125	62,400
RT-711	7.002	7.015	7.010	10.968	11.000	2.000	¾	.125	85,800
RT-712	7.002	7.015	7.010	11.968	12.000	2.000	¾	.125	109,200

ABOVE SIZES IN STOCK FOR IMMEDIATE SHIPMENT

KAYDON *Types of Standard or Special Bearings:*
Spherical Roller • Taper Roller • Ball Radial
Ball Thrust • Roller Radial • Roller Thrust

THE KAYDON ENGINEERING CORP., MUSKEGON, MICH.

All types of Ball and Roller Bearings 4" bore to 120" outside diameter

NONFERROUS METALS

. . . News and Market Activities

Zinc Price Cut Followed by Reductions in Scrap, Other Materials

New York

• • • **The drop of** 1½¢ in the price of zinc that developed last week touched off a wave of price reductions in the scrap market and in brass mill products. There were also reductions in prices of brass and aluminum ingots.

Brass ingot producers reduced their published prices from 1¢ to 2¢ per lb, with the grades taking 70 pct of the volume taking a 1½¢ reduction. Aluminum ingot prices were dropped by 1¢ to 2¢ per lb. The ingot markets are very inactive and lower prices have failed to stimulate any additional buying.

Weakness has continued in all the metal markets, but the zinc trade is unable to foresee the prospect of further reductions in price while the demand for galvanizing continues active and the automobile industry is buying zinc die castings at the rate of 250,000 tons a year.

The weakness in the lead market is considered by market observers to be even more significant due to the greater dependence of the metal on its major market, replacement batteries, that has suffered important reductions in the last 6 months.

Lead at 17¢ is still considered to be overvalued in comparison with prewar market levels. Producers expect the lead market to improve in May when the battery market is expected to pick up again and inventories must be built up.

The brass mills reduced their brass products prices by a fraction of a cent per pound last week to compensate for the lower price of zinc. They also reduced their scrap buying prices on brass grades. The quantity extras on scrap were increased. Quantities of 20,000 lb to 40,000 lb take a premium of ½¢ per lb, and quantities of more than 40,000 lb take a 1¢ premium.

The inactivity of the ingot markets keeps ingot makers largely out of the scrap brass and aluminum markets. Quoted buying prices are nominal. Refineries have dropped their buying prices for copper and brass by 1¢ per lb. But scrap dealers find themselves unable to move any tonnages.

The zinc price drop had already been discounted by the scrap trade, and current prices have dropped only ½¢ per lb. The general weakness in the metal markets has been carried over to scrap tin, pewter and auto babbitt, which have been reduced by 5¢ per lb.

Consumers and the scrap trade are expecting an early drop in copper prices. It is known that nearby copper has been tight, but the general trend toward inventory reduction is expected to have its effect on May and June order volume. Brass mill requirements are down, but the mill order position heavily favors copper products including tubing. Producers are expected to open their books for May next week when it will be possible to develop further information.

The uncertainty of market factors as to the firmness of the copper market during the next few months has been responsible for the current refinery buying prices, the lowest in years. No. 1 copper and wire is being bought at 16¢ per lb. Custom smelters, already loaded up with scrap inventories, have been unwilling to gamble on the price of copper 90 days off. It requires about that length of time to pass the scrap through the refining cycle. Bought at 16¢ per lb, refineries have protected themselves by buying for an 18.50¢ copper market by July.

Metals producers are discovering again that the reduction of a price is not an effective way to encourage renewed buying by consumers. The universal reaction is to consider that the weakness of the market is more deepseated than it appears. Meanwhile consumers withdraw from the market as long as inventories permit or until stabilization appears at a lower level. Current demand for prime western zinc is following this pattern.

A 15-month extension bill for the copper tariff suspension was passed by both branches of Congress last week. This was none too soon as the present bill expires on Mar. 31. The 4¢ per lb tariff will be suspended until the end of June next year. The action was a compromise between the 2-year suspension voted previously by the House and the one year bill of the Senate. Had the action not been taken it could well have resulted in renewal of a critically short copper market, as up to 30,000 tons of foreign copper a month might have been lost to domestic consumers.

Lead Slips Again

New York

The price of lead was reduced another 1¢ per lb on Monday, the third price decline in the metal within a month. This brings the price to 17 cents at New York. The action was taken by American Smelting and Refining Co. St. Joseph Lead Co. did not follow immediately.

Nonferrous Metals Prices

	Mar. 23	Mar. 24	Mar. 25	Mar. 26	Mar. 28	Mar. 29
Copper, electro, Conn.	23.50	23.50	23.50	23.50	23.50	23.50
Copper, Lake, Conn.	23.625	23.625	23.625	23.625	23.625	23.625
Tin, Straits, New York	$1.03	$1.03	$1.03	$1.03	$1.03	$1.03
Zinc, East St. Louis	16.00	16.00	16.00	16.00	16.00	16.00
Lead, St. Louis	17.80	17.80	17.80	17.80	16.85	16.85

Primary Metals

(Cents per lb, unless otherwise noted)

Aluminum, 99+%, 10,000 lb, freight allowed	17.00
Aluminum pig	16.00
Antimony, American, Laredo, Tex.	38.50
Beryllium copper, 3.75-4.25% Be dollars per lb contained Be	$24.50
Beryllium aluminum 5% Be, dollars per lb contained Be	$52.00
Bismuth, ton lots	$2.00
Cadmium, del'd	$2.00
Cobalt, 97-99% (per lb)	$1.65 to $1.72
Copper, electro, Conn. Valley	23.50
Copper, lake, Conn. Valley	23.625
Gold, U. S. Treas., dollars per oz.	$35.00
Indium, 99.8%, dollars per troy oz.	$2.25
Iridium, dollars per troy oz.	$105 to $110
Lead, St. Louis	16.85
Lead, New York	17.00
Magnesium, 99.8+%, f.o.b. Freeport, Tex.	20.50
Magnesium, sticks, carlots	34.50
Mercury, dollars per 76-lb flask, f.o.b. New York	$88 to $94
Nickel, electro, f.o.b. New York	42.93
Palladium, dollars per troy oz.	$24.00
Platinum, dollars per troy oz.	$72 to $75
Silver, New York, cents per oz.	71.50
Tin, Grade A, New York	$1.03
Zinc, East St. Louis	16.00
Zinc, New York	16.70
Zirconium copper, 10-12 pct Zr, per lb contained Zr	$12.00

Remelted Metals

Brass Ingot

(Published prices, cents per lb delivered, carloads)

85-5-5-5 ingot		
No. 115	17.50*	18.50
No. 120	17.00*	18.00
No. 123	16.50*	17.50
80-10-10 ingot		
No. 305		23.75
No. 315		20.75
88-10-2 ingot		
No. 210		30.50
No. 215		27.50
No. 245	21.00*	21.75
Yellow ingot		
No. 405	14.50*	16.00
Manganese bronze		
No. 421		21.50

* F.o.b. Philadelphia.

Aluminum Ingot

(Cents per lb, lots of 30,000 lb)

95-5 aluminum-silicon alloys	
0.30 copper, max.	22.75-23.00
0.60 copper, max.	22.50-22.75
Piston alloys (No. 122 type)	19.50-20.00
No. 12 alum. (No. 2 grade)	18.00-19.00
108 alloy	19.50-20.00
195 alloy	20.00-20.50
13 alloy	22.50-23.00
AXS-679	19.50-20.00

Steel deoxidizing aluminum, notch-bar granulated or shot

Grade 1—95 pct-95½ pct	20.75-21.00
Grade 2—92 pct-95 pct	19.75-20.00
Grade 3—90 pct-92 pct	18.75-19.00
Grade 4—85 pct-90 pct	17.75-18.00

Electroplating Supplies

Anodes

(Cents per lb, freight allowed, in 500 lb lots)

Copper	
Cast, oval, 15 in. or longer	38.64
Electrodeposited	34⅜
Rolled, oval, straight, delivered	37.34
Ball anodes	38⅜
Brass, 80-20	
Cast, oval, 15 in. or longer	35⅞
Zinc, oval, 99.99	
Ball anodes	25.00
Nickel 99 pct plus	
Cast	59.00
Rolled, depolarized	60.00
Cadmium	$2.15
Silver 999 fine, rolled, 100 oz. lots, per troy oz, f.o.b. Bridgeport, Conn.	79

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum	48.00
Copper sulfate, 99.5 crystals, bbls	9.10
Nickel salts, single or double, 4-100 lb bags, frt. allowed	18.00
Nickel chloride, 300 lb bbl	24.50
Silver cyanide, 100 oz. lots, per oz.	59
Sodium cyanide, 96 pct domestic 200 lb drums	19.25
Zinc sulfate, crystals, 22.5 pct, bags	
Zinc sulfate, 25 pct, granules, bbls, frt allowed	

Mill Products

Aluminum

(Base prices, cents per pound, base 30,000 lb, f.o.b. shipping point, freight allowed)

Flat Sheet: 0.188 in., 2S, 3S, 26.9¢; 4S, 61S-O, 28.8¢; 52S, 30.9¢; 24S-O, 24S-OAL, 29.8¢; 75S-O, 75S-OAL, 36.3¢; 0.081 in., 2S, 3S, 27.9¢; 4S, 61S-O, 30.2¢; 52S, 32.3¢; 24S-O, 24S-OAL, 30.9¢; 75S-O, 75S-OAL, 38¢; 0.032 in., 2S, 3S, 29.5¢; 4S, 61S-O, 33.5¢; 52S, 36.2¢; 24S-O, 24S-OAL, 37.9¢; 75S-O, 75S-OAL, 47.6¢.

Plate: ¼ in. and heavier: 2S, 3S, F, 23.8¢; 4S-F, 26¢; 52S-F, 27.1¢; 61S-O, 26.6¢; 24S-F, 24S-FAL, 27.1¢; 75S-F, 75S-FAL, 33.9¢.

Extruded Solid Shapes: Shape factors 1 to 4, 35.1¢ to 66¢; 11 to 13, 36.1¢ to 78¢; 23 to 25, 38.2¢ to $1.07; 35 to 37, 45.7¢ to $1.65; 47 to 49, 67.5¢ to $2.41.

Rod, Rolled: 1.064 to 4.5 in., 2S-F, 3S-F, 34¢ to 30.5¢; Cold-finished, 0.375 to 3.5 in., 2S, 3S, 36.5¢ to 32¢.

Screw Machine Stock: Drawn, ⅛ to 11/32 in., 11S-T3, R317-T4, 49¢ to 38¢; cold-finished, ⅜ to 1½ in., 11S-T3, 37.5¢ to 35.5¢; ⅝ to 2 in., R317-T4, 37.5¢ to 34.5¢; rolled, 1 9/16 to 3 in., 11S-T3, 35.5¢ to 32.5¢; 2⅛ to 3⅝ in., R317-T4, 33.5¢ to 32.5¢. Base 5000 lb.

Drawn Wire: Coiled, 0.051 to 0.374 in.: 2S, 36¢ to 26.5¢; 52S, 44¢ to 32¢; 56S, 47¢ to 38.5¢; 17S-T4, 50¢ to 34.5¢; 61S-T4, 44.5¢ to 34¢; 75S-T6, 76¢ to 55¢.

Magnesium

(Cents per lb, f.o.b. mill, freight allowed Base quantity 30,000 lb)

Sheet and Plate: Ma, FSa, ¼ in., 54¢-56¢; 0.188 in., 56¢-58¢; B & S gage 8, 58¢-60¢; 10, 59¢-61¢; 12, 63¢-65¢; 14, 69¢-74¢; 16, 76¢-81¢; 18, 84¢-89¢; 20, 96¢-$1.01; 22, $1.22-$1.31; 24, $1.62-$1.75. Specification grade higher.

Extruded Round Rod: M, diam. in., ¼ to 0.311, 58¢; ½ to ¾, 46¢; 1¼ to 1.749, 43¢; 2½ to 5, 41¢. Other alloys higher.

Extruded Square, Hex. Bar: M, size across flats, in., ¼ to 0.311, 61¢; ½ to 0.749, 48¢; 1¼ to 1.749, 44¢; 2½ to 4, 42¢. Other alloys higher.

Extruded Solid Shapes, Rectangles: M, in weight per ft, for perimeters of less than size indicated, 0.10 to 0.11 lb. per ft, per. up to 3.5 in., 55¢; 0.22 to 0.25 lb per ft, per. up to 5.9 in., 51¢; 0.50 to 0.59 lb per ft, per. up to 8.6 in., 47¢; 1.8 to 2.59 lb per ft, per. up to 19.5 in., 44¢; 4 to 6 lb per ft, per. up to 28 in., 43¢. Other alloys higher.

Extruded Round Tubing: M, wall thickness, outside diam, in., 0.049 to 0.057, ¼ to 5/16, $1.14; 5/16 to ⅜, $1.02; ½ to ⅝, 76¢; 1 to 2 in., 65¢; 0.065 to 0.082, ⅜ to 7/16, 85¢; ⅝ to ¾, 62¢; 1 to 2 in., 57¢. 0.165 to 0.219, ⅜ to ¾, 54.5¢; 1 to 2 in., 53¢; 3 to 4 in., 49¢. Other alloys higher.

Nickel and Monel

(Base prices, cents per lb, f.o.b. mill)

	Nickel	Monel
Sheets, cold-rolled	60	47
Strip, cold-rolled	66	50
Rods and shapes		
Hot-rolled	56	45
Cold-drawn	56	45
Angles, hot-rolled	56	45
Plates	58	46
Seamless tubes	89	80
Shot and blocks	..	40

Copper, Brass, Bronze

(Cents per pound, freight prepaid on 200 lb)

	Extruded Shapes	Rods	Sheet*
Copper	36.78	....	37.18
Copper, hot-rolled	....	33.03	....
Copper, drawn	....	34.28	....
Low brass	38.70*	....	35.79
Yellow brass	37.11*	....	34.10
Red brass	38.70*	....	35.79
Naval brass	34.33	33.08	39.02
Leaded brass	....	28.63	....
Commercial bronze	39.39*	....	36.73
Manganese bronze	37.92	36.42	42.52
Phosphor bronze, 5 pct	....	....	56.05
Muntz metal	33.89	32.64	37.08
Everdur, Herculoy, Olympic, etc.	....	40.67	41.73
Nickel silver, 10 pct	46.38	46.74	44.44
Architectural bronze	32.73	....	....

* Seamless tubing.

Scrap Metals

Brass Mill Scrap

(Cents per pound; add ½c per lb for shipments of 20,000 to 40,000 lb; add 1¢ for more than 40,000 lb)

	Heavy	Turnings
Copper	21⅛	20⅜
Yellow brass	18⅜	17½
Red brass	19⅝	18⅞
Commercial bronze	20	19¼
Manganese bronze	18⅛	17¼
Leaded brass rod ends	18⅛	

Custom Smelters' Scrap

(Cents per pound, carload lots, delivered to refinery)

No. 1 copper, wire	16.00
No. 2 copper, wire	15.00
Light copper	14.00
Refinery brass	14.50*

* Dry copper content.

Ingot Makers' Scrap

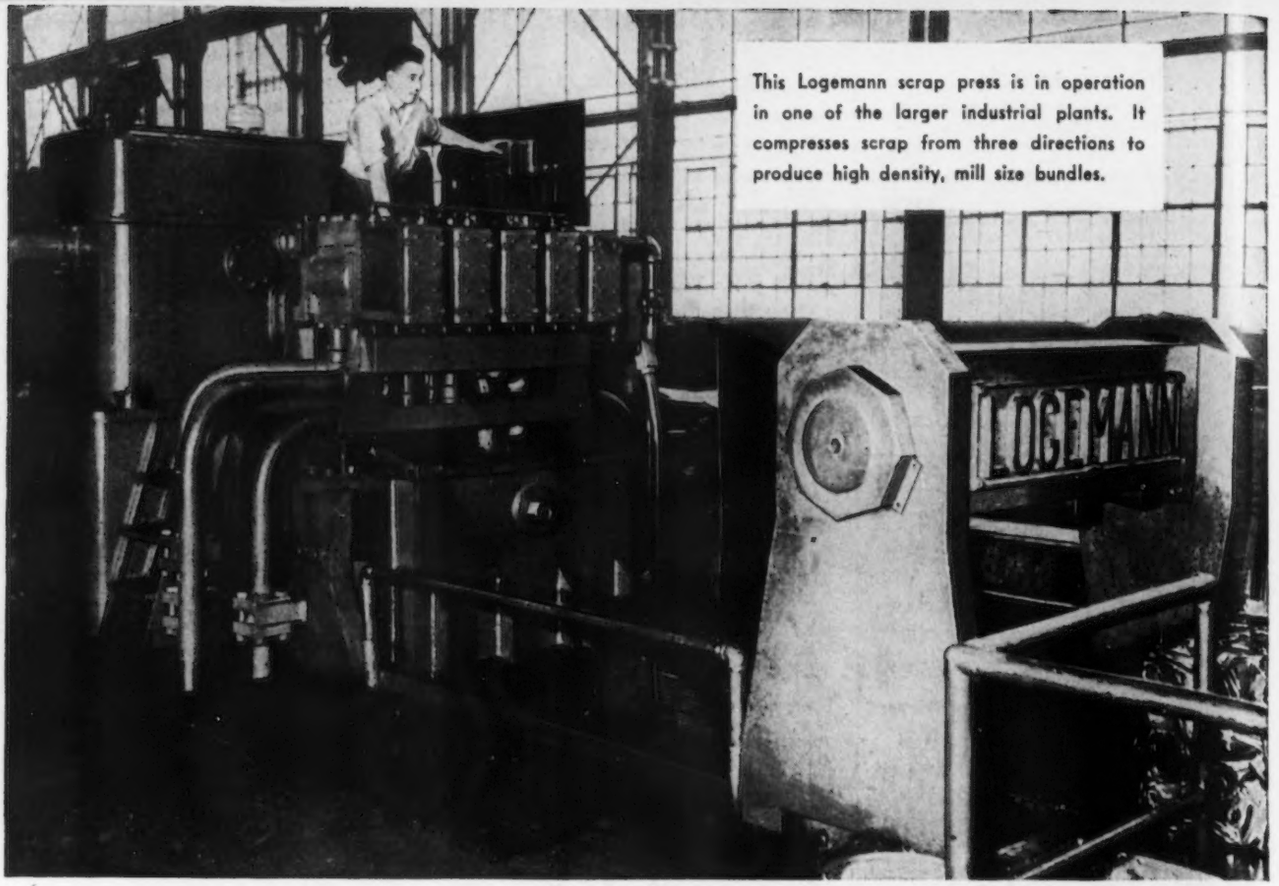
(Cents per pound, carload lots, delivered to producer)

No. 1 copper, wire	16.00
No. 2 copper, wire	15.00
Light copper	14.00
No. 1 composition	11.50
No. 1 comp. turnings	11.00
Rolled brass	10.50
Brass pipe	11.00
Radiators	10.00
Heavy yellow brass	9.00
Aluminum	
Mixed old cast	9.50
Mixed old clips	9.50
Mixed turnings, dry	8.00
Pots and pans	9.50
Low copper	13.00

Dealers' Scrap

(Dealers' buying prices, f.o.b. New York in cents per pound)

Copper and Brass	
No. 1 heavy copper and wire	14¾—15
No. 2 heavy copper and wire	13¾—14
Light copper	12¾—13
Auto radiators (unsweated)	8¾— 9
No. 1 composition	10 —10¼
No. 1 composition turnings	9¾—10
Clean red car boxes	8¾— 9
Cocks and faucets	8¾— 9
Mixed heavy yellow brass	7 — 7¼
Old rolled brass	8¼— 8¾
Brass pipe	9¼— 9¾
New soft brass clippings	14 —14½
Brass rod ends	10½—11
No. 1 brass rod turnings	**8½— 9**
Aluminum	
Alum. pistons and struts	5 — 5½
Aluminum crankcases	7 — 7½
2S aluminum clippings	12½—13
Old sheet and utensils	7 — 7½
Borings and turnings	4 — 4½
Misc. cast aluminum	7 — 7½
Dural Clips (24S)	7 — 7½
Zinc	
New zinc clippings	10 —10½
Old zinc	7 — 7½
Zinc routings	4½— 5
Old die cast scrap	4½— 5
Nickel and Monel	
Pure nickel clippings	20 —21
Clean nickel turnings	15 —16
Nickel anodes	20 —21
Nickel rod ends	19 —21
New Monel clippings	15½—16½
Clean Monel turnings	10 —11
Old sheet Monel	12 —13
Old Monel castings	10 —11
Inconel clippings	13 —14
Nickel silver clippings, mixed	7½— 8
Nickel silver turnings, mixed	6½— 7
Lead	
Soft scrap lead	10½—11
Battery plates (dry)	5 — 5½
Magnesium Alloys	
Segregated solids	8 — 9
Castings	4½— 5½
Miscellaneous	
Block tin	77 —79
No. 1 pewter	60 —62
No. 1 auto babbitt	46 —48
Mixed common babbitt	13½—14
Solder joints	16 —17
Siphon tops	48 —50
Small foundry type	14½—15
Monotype	13½—14
Lino. and stereotype	13 —13½
Electrotype	11 —11½
New type shell cuttings	12¾—13
Hand picked type shells	6 — 6¼
Lino. and stereo. dross	7½— 8
Electro. dross	5½— 6



This Logemann scrap press is in operation in one of the larger industrial plants. It compresses scrap from three directions to produce high density, mill size bundles.

Self-Contained . . . .
Triple Compression . .
Automatically Controlled

LOGEMANN SCRAP PRESSES

handle high tonnages with minimum labor . . . *at low cost*

•

LOGEMANN METAL BALERS

. . . are built in a large range of sizes to meet specific conditions. Let Logemann's engineering service help you arrive at the most efficient and economical way of handling your scrap.

•

The compact unit illustrated is completely self-contained with oil tank and pump located directly over the press . . . utilizing the advantages of short pipe lines. Automatic controls, mounted in front of pump, give the operator full visibility at all times. Controls operate rams successively within a single rigid box. There is no complex construction which means there is *no need for specially-trained maintenance crews.*

Both two-ram and three-ram models are available with automatic controls or for manual manipulation.

Logemann Bros. Co. have specialized in the production of scrap metal presses for sheet mills, stamping plants, scrap yards, and metal manufacturing plants of all types for nearly 75 years. Write for full information — please state the nature of your scrap and tonnage.

LOGEMANN BROTHERS COMPANY
3164 W. Burleigh Street • Milwaukee 10, Wisconsin

SCRAP

. . . News and Market Activities

Prices Down Sharply in Dull Market

New York

• • • **This week the** scrap market suffered its worst blow since prices first started to decline several months ago. As this was written consumers still were not taking advantage of the lower prices being offered. Sales are scarce at lower prices. It has been definitely established that some consumers are presently not interested in buying at any price.

This week THE IRON AGE scrap composite price decreased $3.75 per gross ton. This price is based on the average prices of No. 1 heavy melting steel at Pittsburgh, Philadelphia and Chicago. This item fell an average of $4.25 at Pittsburgh, $2 at Chicago and $5 at Philadelphia. Current No. 1 quotations are: Pittsburgh, $32 to $33; Chicago, $31 to $32; and Philadelphia, $29 to $30.

Prices slipped badly in other areas, too. In some cases it has been necessary to resort to market appraisal and offering prices because of the apparent intent of major consumers to stay out of the market. Consequently, some prices listed this week are necessarily nominal.

Brokers and dealers see little hope for a stabilized market until consumers are willing to purchase sizable tonnages "at some price." Meanwhile, consumers have little to say except "we are not buying." They continue to melt their high-priced inventories as rapidly as possible.

Little hope was expressed for a stabilized market in the near future. Gloom prevailed in nearly all areas. The current decline, while sharper than those of recent weeks, was viewed generally as a deeper probing for a level at which consumers might be tempted to buy. There is no indication that it has yet been reached.

•

PITTSBURGH—On appraisal of all factors including broker offering prices and complete lack of strength in this market, quotations were off sharply this week. The latest sale of genuine low phos was at $35 per gross ton delivered. This sale plus bona fide offers totaled 1000 tons. No. 1 steel is quotable at $32 to $33 a ton against a sale last week at $36. Shoveling turnings were sold at $25 last week. Declining conversion deals and dips in demand for alloy steels have hit electric furnace operators and so reduced the premium formerly commanded by low phos scrap. Nothing is in sight that would indicate a turn in this market unless mill buying becomes bigger and more frequent, but mill inventories are still too big to permit heavy buying.

•

CHICAGO — Carnegies' purchase last week was small, but these prices established the new market, as this sale was the only one of any significance made. Turnings slipped lower also, and these items are still weak. Railroad specialties continued their downward trend. At the moment there is no strength shown anywhere in the market. The mills are still working off old high-priced inventories, and the foundries are operating on reduced schedules. One fact may be worth noting. There is very little No. 2 heavy melting scrap in the dealers' yards. Should any mill try to purchase a substantial quantity, observers here say the market would firm in a hurry.

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PHILADELPHIA — Scrap buyers remained out of the market last week and pessimism reigned everywhere. Shipments have all but ceased. There were wide variations in prices at which brokers would be willing to take orders, but an appraisal of the market drops No. 1 by $5, No. 2 by $4, No. 2 bundles $4, turnings by $2, shovelings by $5. In cast grades, machinery is down $4, yard $5, breakable $4. The low phos market is down by $2 and $3. Rail specialties are down $3. Cast iron carwheels are down $2. Several steel producers in this district have taken off openhearth furnaces largely because of the decline in the conversion market.

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CLEVELAND—On appraisal, the scrap market here and in the valley was progressively weaker this week and moving toward a $30 top. No. 1 steel is beginning to go into No. 2 steel, as the number of conversion facilities removed from production increases. Some brokers are laying low on the orders they have, trying to buy at lower prices, an action which tends to weaken the market further. The two big questions this week are: (1) Will the mills buy? (2) If so, how much will they knock the price down?

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CINCINNATI—In the absence of actual sales prices here were weaker this week on appraisal. Mills are out of the market, sitting tight with big inventories in most cases and generally disinterested in anything but token tonnages. Foundries are apparently not interested in anything at any price, according to brokers, who keep offering foundry grades at lower prices with little success. On the other hand, little tonnage is moving into dealers' yards, making the entire picture here one of inactivity.

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DETROIT—There is abundant evidence again this week to indicate that scrap prices are tumbling here. Most brokers are declining to make firm commitments. With local mills expected to come into the market later in the week for their April scrap requirements, some of the present confusion will be dissipated, it is expected. Based on a survey of brokers and including firm offers by several scrap sources, prices of openhearth grades are down $3 this week. An even steeper decline of $5 per ton is reported for cast grades. However, even at these lower prices there is an absence of buying. In response to the present conditions, the price range of No. 1 cupola cast steel has been broadened to $5 and the separate classifications of machinery cast and mixed yard cast used heretofore have been abandoned.

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NEW YORK—Brokers in this area are still probing for a price level on which substantial tonnages can be moved. Apparently they have not found it yet. Some report business virtually at a stand still. Price declines this week range from $1 to $3. One broker bought a substantial tonnage of No. 2 heavy melting at $20, causing the quotation on this grade to drop $3 from the previous week. Price declines so far have failed to tempt consumers and this market must still be rated weak.

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ST. LOUIS—Most items on the scrap iron list are sharply down this week. Sales being made as the result of pressure on dealers. Railroad offerings have been fairly large and some dealers have bought scrap without orders and have been forced to sell. The mills have not changed their buying prices on No. 2 heavy melting steel or No. 2 bundled sheets, and will not do so until Apr. 15, when dealers expect lower prices.

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BOSTON — Scrap prices continued to drop in a lifeless market. A new low of $23 to $24 for No. 1 heavy melting was quoted and the question is how much further can it go? The situation in cast is just as bad as it has been now for about 2 months—no business and nobody daring to quote prices.

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BIRMINGHAM—Trading in this market has dropped off to the lowest point in months, if not in years. Republic still is out of the market for openhearth grades and the big consumers of cast iron are doing very little buying.

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BUFFALO—Withdrawal of several leading producers of ferrous specialties from the turnings market sliced $2 off the light end of the list this week. These nearby consumers, who have provided a principal outlet for turnings here since the war, were reported out of the market for 1 to 3 months. Machine shop turnings were reduced to $18-19 a ton and shovelings to $20-21 a ton. Heavier grades are down $1 a ton with consumers on the sidelines.

Going prices as obtained in the trade by THE IRON AGE, based on representative tonnages.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting	$32.00 to $33.00
RR. hvy. melting	33.00 to 34.00
No. 2 hvy. melting	30.00 to 31.00
No. 2 bundles	29.00 to 30.00
RR. scrap rails	39.00 to 40.00
Rails 2 ft and under	45.00 to 46.00
No. 1 comp'd bundles	32.00 to 33.00
Hand bdld. new shts.	32.00 to 33.00
Hvy. steel forge turn.	31.00 to 32.00
Mach. shop turn.	21.00 to 22.00
Shoveling turn.	24.00 to 25.00
Mixed bor. and turn.	21.00 to 22.00
Cast iron borings	23.00 to 24.00
No. 1 mach. cast.	38.00 to 40.00
Mixed yard cast.	30.00 to 32.00
Hvy. breakable cast.	31.00 to 32.00
Malleable	39.00 to 40.00
RR. knuck. and cup	41.00 to 42.00
RR. coil springs	41.00 to 42.00
RR. leaf springs	41.00 to 42.00
Rolled steel wheels	41.00 to 42.00
Low phos.	34.00 to 35.00

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 bundles	31.00 to 32.00
No. 2 dealers' bundles	26.00 to 27.00
Bundled mach. shop turn.	24.00 to 25.00
Galv. bundles	23.00 to 24.00
Mach. shop turn.	19.00 to 20.00
Short shov. turn.	19.00 to 20.00
Cast iron borings	19.00 to 20.00
Mix. borings and turn.	19.00 to 20.00
Low phos. hvy. forge	35.00 to 37.00
Low phos. plates	33.00 to 35.00
No. 1 RR. hvy. melt.	34.00 to 35.00
Rerolling rails	41.00 to 42.00
Miscellaneous rails	37.00 to 38.00
Angles & splice bars	35.00 to 37.00
Locomotive tires, cut	37.00 to 39.00
Cut bolster & side frames	34.00 to 36.00
Standard stl. car axles	50.00 to 53.00
No. 3 steel wheels	38.00 to 39.00
Couplers and knuckles	36.00 to 38.00
Rails, 2 ft and under	41.00 to 42.00
Malleable	32.00 to 34.00
No. 1 mach. cast.	37.00 to 39.00
No. 1 agricul. cast.	35.00 to 36.00
Heavy breakable cast.	33.00 to 35.00
RR. grate bars	25.00 to 27.00
Cast iron brake shoes	30.00 to 32.00
Cast iron car wheels	36.00 to 38.00

CINCINNATI

Per gross ton, f.o.b. cars:

No. 1 hvy. melting	$28.50 to $29.00
No. 2 hvy. melting	27.50 to 28.00
No. 1 bundles	28.50 to 29.00
No. 2 bundles	26.50 to 27.00
Mach. shop turn.	17.50 to 18.00
Shoveling turn.	17.50 to 18.00
Cast iron borings	18.50 to 19.00
Mixed bor. & turn.	17.50 to 18.00
Low phos. 18 in. under	35.50 to 36.50
No. 1 cupola cast.	39.00 to 40.00
Hvy. breakable cast.	33.00 to 34.00
Rails 18 in. and under	42.00 to 43.00
Rails random length	32.00 to 33.00
Drop broken	41.00 to 42.00

BOSTON

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$23.00 to $24.00
No. 2 hvy. melting	18.00
No. 1 bundles	18.00 to 19.00
No. 2 bundles	16.00 to 16.50
Bushelings	18.00
Shoveling turn.	17.00 to 17.50
Machine shop turn.	11.00 to 12.00
Mixed bor. and turn.	10.00 to 11.00
Cl'n cast chem. bor.	25.00 to 29.00
No. 1 machinery cast.	26.00 to 30.00
No. 2 machinery cast.	26.00 to 30.00
Heavy breakable cast.	20.00
Stove plate	20.50 to 21.00

DETROIT

Per gross ton, brokers' buying prices f.o.b. cars:

No. 1 hvy. melting	$26.00 to $27.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 bundles	28.00 to 29.00
New busheling	26.00 to 27.00
Flashings	26.00 to 27.00
Mach. shop turn.	16.00 to 17.00
Machinery cast.	35.00 to 37.00
Mixed yard cast.	32.00 to 34.00
Shoveling turn.	17.00 to 18.00
Cast iron borings	17.00 to 18.00
Mixed bor. & turn.	16.00 to 17.00
Low phos. plate	28.00 to 29.00
Heavy breakable cast.	21.00 to 26.00
Stove plate	24.00 to 26.00
Automotive cast.	27.00 to 32.00
No. 1 cupola cast.	27.00 to 32.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	25.00 to 26.00
No. 1 bundles	29.00 to 30.00
No. 2 bundles	22.00 to 22.50
Mach. shop turn.	18.00 to 19.00
Shoveling turn.	20.00 to 21.00
Mixed bor. and turn.	17.00 to 18.00
Clean cast chemical bor.	25.00 to 30.00
No. 1 machinery cast.	34.00 to 35.00
No. 1 mixed yard cast.	30.00 to 31.00
Hvy. breakable cast.	30.00 to 31.00
Hvy. axle forge turn.	29.00 to 30.00
Low phos. acid openhearth	34.00 to 35.00
Low phos. electric furnace	35.00 to 36.00
Low phos. bundles	33.00 to 34.00
RR. steel wheels	36.00 to 37.00
RR. coil springs	36.00 to 37.00
RR. malleable	30.00 to 32.00
Cast iron carwheels	36.00 to 37.00

ST. LOUIS

Per gross ton delivered to consumer:

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	29.00 to 30.00
No. 2 bundled sheets	29.00 to 30.00
Mach. shop turn.	17.00 to 18.00
Shoveling turnings	17.00 to 18.00
Locomotive tires, uncut	34.00 to 35.00
Mis. std. sec. rails	32.00 to 33.00
Steel angle bars	33.00 to 34.00
Rails 3 ft. and under	37.00 to 38.00
RR. steel springs	36.00 to 37.00
Steel car axles	45.00 to 46.00
Brake shoes	30.00 to 31.00
Malleable	30.00 to 31.00
Cast iron car wheels	36.00 to 37.00
No. 1 machinery cast.	37.00 to 38.00
Hvy. breakable cast.	29.00 to 30.00
Stove plate	32.00 to 33.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting	$29.00
No. 2 hvy. melting	29.00
No. 2 bundles	27.00
No. 1 busheling	29.00
Long turnings	22.00
Shoveling turnings	24.00
Cast iron borings	24.00
Bar crops and plate	$30.00 to 32.00
Structural and plate	30.00 to 32.00
No. 1 cupola cast.	40.00
Stove plate	35.00 to 36.00
No. 1 RR. hvy. melt.	32.50 to 34.00
Steel axles	41.00 to 43.00
Scrap rails	37.00 to 38.00
Rerolling rails	38.00 to 40.00
Angles & splice bars	40.00 to 42.00
Rails 3 ft & under	40.00 to 42.00
Cast iron carwheels	39.00 to 40.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting	$32.00 to $33.00
No. 2 hvy. melting	30.00 to 31.00
No. 1 bundles	32.00 to 33.00
No. 2 bundles	29.00 to 30.00
Mach. shop turn.	22.00 to 23.00
Short shov. turn.	24.00 to 25.00
Cast iron borings	22.00 to 23.00
Low phos.	34.00 to 35.00

NEW YORK

Brokers' buying prices per gross ton, on cars:

No. 1 hvy. melting	$23.00 to $24.00
No. 2 hvy. melting	20.00 to 21.00
No. 2 bundles	18.50 to 19.50
Mach. shop turn.	13.00 to 14.00
Mixed bor. & turn.	13.00 to 14.00
Shoveling turnings	16.50 to 17.50
Machinery cast.	29.00 to 30.00
Mixed yard cast.	26.00 to 27.00
Heavy breakable cast.	25.00 to 26.00
Charging box cast.	25.00 to 26.00
Unstrp. motor blks.	24.00 to 25.00
Cl'n cast chem. bor.	25.00 to 30.00

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	28.00 to 29.00
No. 1 bundles	28.00 to 29.00
No. 2 bundles	25.00 to 26.00
No. 1 busheling	28.00 to 29.00
Mach. shop turn.	18.00 to 19.00
Shoveling turn.	20.00 to 21.00
Cast iron borings	18.00 to 19.00
Mixed bor. and turn.	18.00 to 19.00
Clean auto. cast.	37.00 to 39.00
Mixed yard cast.	31.00 to 32.00
Stove plate	31.00 to 32.00
RR. malleable	33.00
Small indus. malleable	31.00 to 32.00
Low phos. plate	35.00 to 36.00
Scrap rails	39.00 to 40.00
Rails 3 ft & under	43.00 to 44.00
RR. steel wheels	39.00 to 40.00
RR. coil & leaf spgs.	39.00 to 40.00
RR. knuckles & coup.	39.00 to 40.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 bundles	31.00 to 32.00
No. 2 bundles	28.00 to 29.00
No. 1 busheling	28.00 to 29.00
Drop forge flashings	30.00 to 31.00
Mach. shop turn.	20.00 to 21.00
Shoveling turn.	23.00 to 24.00
Steel axle turn.	25.00 to 26.00
Cast iron borings	23.00 to 24.00
Mixed bor. & turn.	22.00 to 23.00
Low phos. 2 ft and under	34.00 to 35.00
No. 1 mach. cast.	40.00 to 41.00
Malleable	35.00 to 36.00
RR. cast.	40.00 to 41.00
Railroad grate bars	34.00 to 35.00
Stove plate	34.00 to 35.00
RR. hvy. melting	35.50 to 36.00
Rails 3 ft and under	44.00 to 46.00
Rails 18 in. and under	45.00 to 47.00

SAN FRANCISCO

Per gross ton, f.o.b. shipping point:

No. 1 hvy. melting	$25.00
No. 2 hvy. melting	25.00
No. 1 bales	23.00
No. 2 bales	23.00
No. 3 bales	20.00
Mach. shop turn.	15.00
Elec. fur. 1 ft under	$37.50 to 40.00
No. 1 cupola cast.	33.50 to 35.00
RR. hvy. melting	25.00
Rails	25.00

LOS ANGELES

Per gross ton, f.o.b. shipping point:

No. 1 hvy. melting	$25.00
No. 2 hvy. melting	25.00
No. 1 bales	23.00
No. 2 bales	23.00
No. 3 bales	20.00
Mach. shop turn.	15.00
Elec. fur. 1 ft. under	$32.00 to 38.00
No. 1 cupola cast.	33.50 to 35.00
RR. hvy. melting	25.00

SEATTLE

Per gross ton delivered to consumer:

No. 1 & No. 2 hvy. melt.	$25.00
No. 1 & No. 2 bales	23.00
No. 3 bales	23.00
Elec. fur. 1 ft. and under	36.00
No. 1 cupola cast.	$30.00 to 40.00
RR. hvy. melting	25.00

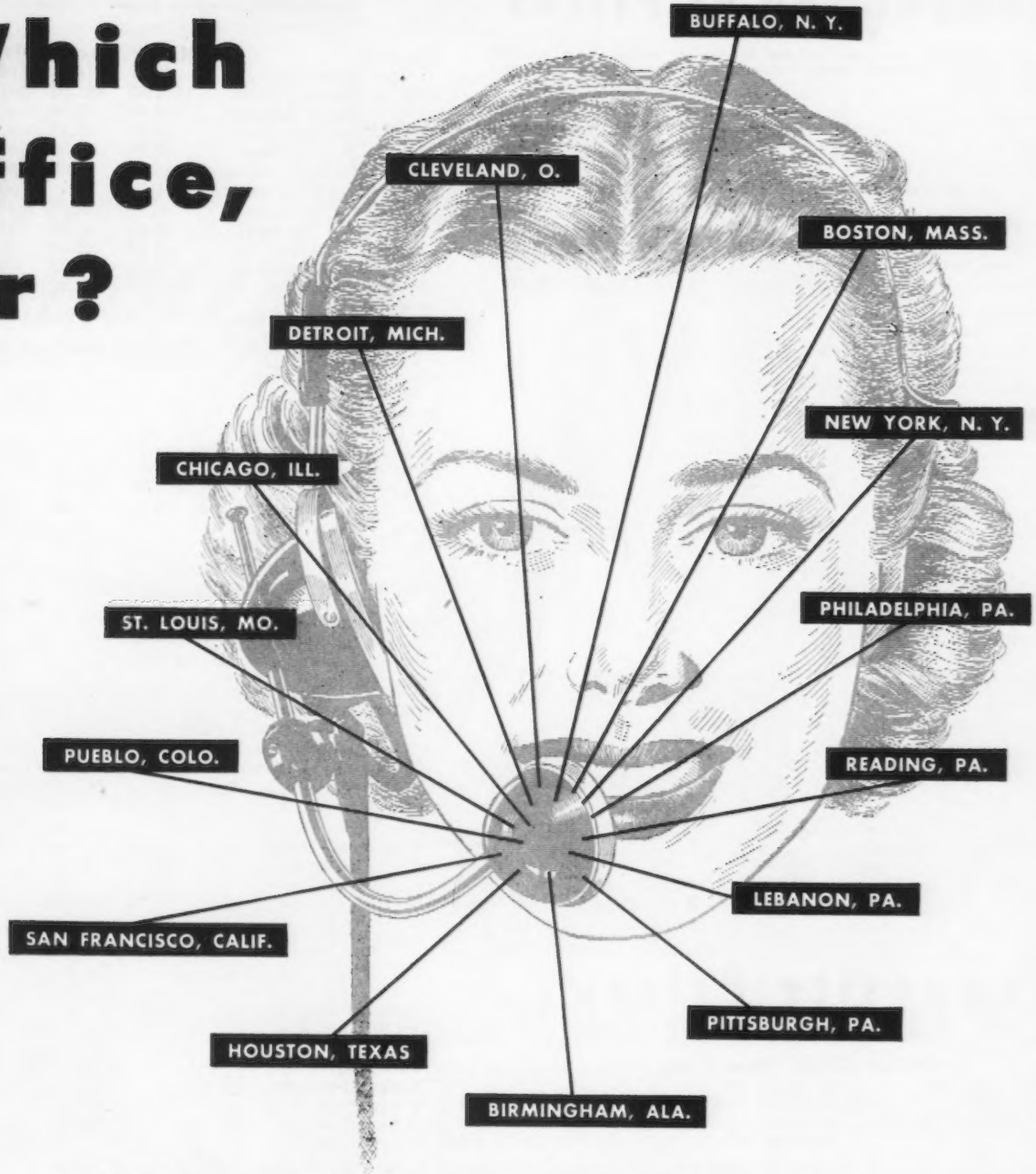
HAMILTON, ONT.

Per gross ton delivered to consumer: Cast grades f.o.b. shipping point:

Heavy melting	$23.00*
No. 1 bundles	23.00*
No. 2 bundles	22.50*
Mechnical bundles	21.00*
Mixed steel scrap	19.00*
Mixed borings and turnings	17.00*
Rails, remelting	23.00*
Rails, rerolling	26.00*
Bushelings	17.50*
Bushelings, new fact. prop'd	21.00*
Bushelings, new fact. unprop'd	16.00*
Short steel turnings	17.00*
No. 1 cast.	$48.00 to 50.00*
No. 2 cast.	44.00 to 45.00*

*Ceiling Price.

Which office, sir?



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LEADERS IN IRON AND STEEL SCRAP SINCE 1889

Comparison of Prices . .

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Flat-Rolled Steel: (cents per pound)	Mar. 29, 1949	Mar. 22, 1949	Mar. 1, 1949	Mar. 30, 1948
Hot-rolled sheets	3.26	3.26	3.26	2.80
Cold-rolled sheets	4.00	4.00	4.00	3.55
Galvanized sheets (10 ga)	4.40	4.40	4.40	3.95
Hot-rolled strip	3.265	3.265	3.265	2.80
Cold-rolled strip	4.063	4.063	4.063	3.55
Plates	3.42	3.42	3.42	2.95
Plates wrought iron	7.85	7.85	7.85	7.25
Stains C-R strip (No. 302)	33.25	33.25	33.25	30.50
Tin and Terneplate: (dollars per base box)				
Tinplate (1.50 lb) cokes	$7.75	$7.75	$7.75	$6.80
Tinplate, electro (0.50 lb)	6.70	6.70	6.70	6.00
Special coated mfg. ternes	6.65	6.65	6.65	5.90
Bars and Shapes: (cents per pound)				
Merchant bars	3.35	3.37	3.37	2.90
Cold-finished bars	3.995	3.995	3.995	3.55
Alloy bars	3.75	3.75	3.75	3.30
Structural shapes	3.25	3.25	3.25	2.80
Stainless bars (No. 302)	28.50	28.50	28.50	26.00
Wrought iron bars	9.50	9.50	9.50	8.65
Wire: (cents per pound)				
Bright wire	4.15	4.15	4.194	3.55
Rails: (dollars per 100 lb)				
Heavy rails	$3.20	$3.20	$3.20	$2.75
Light rails	3.55	3.55	3.55	3.10
Semifinished Steel: (dollars per net ton)				
Rerolling billets	$52.00	$52.00	$52.00	$45.00
Slabs, rerolling	52.00	52.00	52.00	45.00
Forging billets	61.00	61.00	61.00	54.00
Alloy blooms, billets, slabs	63.00	63.00	63.00	66.00
Wire rod and Skelp: (cents per pound)				
Wire rods	3.463	3.463	3.619	2.80
Skelp	3.25	3.25	3.25	2.90

Pig Iron: (per gross ton)	Mar. 29, 1949	Mar. 22, 1949	Mar. 1, 1949	Mar. 30, 1948
No. 2, foundry, Phila.	$51.56	$51.56	$51.56	$44.61
No. 2, Valley furnace	46.50	46.50	46.50	39.50
No. 2, Southern Cin'ti*	49.46	49.46	49.46	43.28
No. 2, Birmingham	43.38	43.38	43.38	37.38
No. 2, foundry, Chicago†	46.00	46.00	46.00	39.00
Basic del'd Philadelphia*	50.76	50.76	50.76	44.11
Basic, Valley furnace	46.00	46.00	46.00	39.00
Malleable, Chicago†	46.50	46.50	46.50	39.50
Malleable, Valley	46.50	46.50	46.50	39.50
Charcoal, Chicago	73.78	73.78	73.78	62.46
Ferromanganese‡	161.40	161.40	161.40	145.00

† The switching charge for delivery to foundries in the Chicago district is $1 per ton.
‡ Average of U. S. prices quoted on Ferroalloy page.
* Does not include interim increase on total freight charges, effective Jan. 11, 1949.

Scrap (per gross ton)	Mar. 29, 1949	Mar. 22, 1949	Mar. 1, 1949	Mar. 30, 1948
Heavy melt'g steel, P'gh.	*$32.50*	$36.75	$38.75	$40.25
Heavy melt'g steel, Phila.	*29.50*	34.50	38.50	41.50
Heavy melt'g steel, Ch'go	*31.50*	33.50	34.50	39.00
No. 1, hy. comp. sh't, Det.	*28.50*	31.00	34.00	35.50
Low phos. Young'n	*34.50*	39.00	43.50	45.25
No. 1, cast, Pittsburgh	*39.00*	41.50	49.00	64.00
No. 1, cast, Philadelphia	*34.50*	38.50	44.00	65.50
No. 1, cast, Chicago	*38.00*	41.50	43.50	69.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.50	$14.50	$14.50	$12.50
Foundry coke, prompt	16.50	16.50	16.50	14.00
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electro, Conn.	23.50	23.50	23.50	21.50
Copper, Lake Conn.	23.625	23.625	23.625	21.625
Tin, Grade A, New York	$1.03	$1.03	$1.03	94.00
Zinc, East St. Louis	*16.00*	17.50	17.50	12.00
Lead, St. Louis	*16.85*	17.80	21.30	14.80
Aluminum, virgin	17.00	17.00	17.00	15.00
Nickel, electrolytic	42.93	42.93	42.93	36.56
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	38.50	38.50	38.50	33.00

Composite Prices . .

Starting with the issue of Apr. 22, 1943, the weighted finished steel index was revised for the years 1941, 1942, and 1943. See explanation of the change on p. 90 of the Apr. 22, 1943, issue. Index revised to a quarterly basis as of Nov. 16, 1944; for details see p. 98 of that issue. The finished steel composite price for the current quarter is an estimate based on finished steel shipments for the previous quarter. This figure will be revised when shipments for this quarter are compiled.

	FINISHED STEEL (Base Price)	PIG IRON	SCRAP STEEL
Mar. 29, 1949	3.75197¢ per lb.	$46.74 per gross ton	*$31.17* per gross ton
One week ago	3.75454¢ per lb.	$46.74 per gross ton	$34.92 per gross ton
One month ago	3.75701¢ per lb.	$46.74 per gross ton	$37.25 per gross ton
One year ago	3.27585¢ per lb.	$40.29 per gross ton	$40.25 per gross ton

	HIGH	LOW	HIGH	LOW	HIGH	LOW
1949	3.76049¢ Jan. 1	3.75197¢ Mar. 29	$46.82 Jan. 4	$46.74 Jan. 25	$43.00 Jan. 1	$31.17 Mar. 29
1948	3.75700¢ July 27	3.22566¢ Jan. 1	46.91 Oct. 12	39.58 Jan. 6	43.16 July 27	39.75 Mar. 9
1947	3.19541¢ Oct. 7	2.87118¢ Jan. 7	37.98 Dec. 30	30.14 Jan. 7	42.58 Oct. 28	29.50 May 20
1946	2.83599¢ Dec. 31	2.54490¢ Jan. 1	30.14 Dec. 10	25.37 Jan. 1	31.17 Dec. 24	19.17 Jan. 1
1945	2.44104¢ Oct. 2	2.54490¢ Jan. 2	25.37 Oct. 23	23.61 Jan. 2	19.17 Jan. 2	18.92 May 22
1944	2.30837¢ Sept. 5	2.21189¢ Oct. 5	$23.61	$23.61	19.17 Jan. 11	15.76 Oct. 24
1943	2.29176¢	2.29176¢	23.61	23.61	$19.17	$19.17
1942	2.28249¢	2.28249¢	23.61	23.61	19.17	19.17
1941	2.43078¢	2.43078¢	$23.61 Mar. 20	$23.45 Jan. 2	$22.00 Jan. 7	$19.17 Apr. 10
1940	2.30467¢ Jan. 2	2.24107¢ Apr. 16	23.45 Dec. 23	22.61 Jan. 2	21.83 Dec. 30	16.04 Apr. 9
1939	2.35367¢ Jan. 3	2.26689¢ May 16	22.61 Sept. 19	20.61 Sept. 12	22.50 Oct. 3	14.08 May 16
1938	2.58414¢ Jan. 4	2.27207¢ Oct. 18	23.25 June 21	19.61 July 6	15.00 Nov. 22	11.00 June 7
1937	2.58414¢ Mar. 9	2.32263¢ Jan. 4	23.25 Mar. 9	20.25 Feb. 16	21.92 Mar. 30	12.67 June 9
1936	2.32263¢ Dec. 28	2.05200¢ Mar. 10	19.74 Nov. 24	18.73 Aug. 11	17.75 Dec. 21	12.67 June 8
1935	2.07642¢ Oct. 1	2.06492¢ Jan. 8	18.84 Nov. 5	17.83 May 14	13.42 Dec. 10	10.33 Apr. 29
1934	2.15367¢ Apr. 24	1.95757¢ Jan. 2	17.90 May 1	16.90 Jan. 27	13.00 Mar. 13	9.50 Sept. 25
1933	1.95578¢ Oct. 3	1.75836¢ May 2	16.90 Dec. 5	13.56 Jan. 3	12.25 Aug. 8	6.75 Jan. 3
1932	1.89196¢ July 5	1.83901¢ Mar. 1	14.81 Jan. 5	13.56 Dec. 6	8.50 Jan. 12	6.43 July 5
1931	1.99626¢ Jan. 13	1.86586¢ Dec. 29	15.90 Jan. 6	14.79 Dec. 15	11.33 Jan. 6	8.50 Dec. 29
1929	2.31773¢ May 28	2.26498¢ Oct. 29	18.71 May 14	18.21 Dec. 17	17.58 Jan. 29	14.08 Dec. 8

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing major portion of finished steel shipments. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

DOLLARS out of YOUR SCRAP PILE

Not an impossibility if your scrap broker has that extra "know-how".

We at Alter Company feel that we can supply that added knowledge which will allow you to receive greater returns from your scrap.

- Cast Iron
- Electric Furnace Grades
- Open Hearth
- Foundry Steel
- Sheet Iron for Baling
- Stainless Steel
- Non-Ferrous Metals

Over 50 Years

ALTER
COMPANY

1700 ROCKINGHAM ROAD DAVENPORT 2, IOWA

Iron and Steel Prices . . .

Steel prices shown here are f.o.b. producing points in cents per pound unless otherwise indicated. Extras apply. (1) Commercial quality sheet grade; prices, 0.25¢ above base. (2) Commercial quality grade. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Cokes, 1.25 lb, deduct 25¢ per base box. (6) 18 gage and heavier. (7) For straight length material only from producers to fabricators. (8) Also shafting. For quantities of 40,000 lb and over. (9) Carload lot in manufacturing trade. (10) Hollowware enameling, gages 29 to 31 only. (11) Produced to dimensional tolerances in AISI Manual Sec. 6. (12) Slab prices subject to negotiation in most cases. (13) San Francisco only. (14) Los Angeles only. (15) San Francisco and Los Angeles only. (16) Seattle only. (17) Seattle and Los Angeles only.

PRODUCTS	Base prices at producing points apply to the sizes and grades produced in these areas														
	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio		Detroit	Johnstown	Seattle, S. Frisco, LosAngeles	Fontana
INGOTS Carbon forging	$50.00														
Alloy	$51.00						(per net ton)								
BILLETS, BLOOMS, SLABS Carbon, rerolling[12]	$52.00				$52.00	$52.00	(per net ton)						$52.00		
Carbon forging billets	$61.00	$61.00	$61.00	$61.00	$61.00	$61.00	(per net ton)						$61.00		
Alloy	$63.00	$63.00				$63.00	(Bethlehem, Canton, Massillon = $63.00) (per net ton)								
PIPE SKELP	3.25						3.25				Warren =3.25				
WIRE RODS	3.40	3.40		3.40	3.40		3.65	3.50			Worcester 3.70		3.40	4.05[13] 4.10[14]	
SHEETS Hot-rolled[6]	3.25 to 3.30	3.25	3.25	3.25-3.30	3.25	3.25	3.25	3.25		Warren, Ashland =3.25		3.45		3.95[15]	4.15
Cold-rolled[1]	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.20	4.00	Warren 4.00	4.20		Pittsburg, Cal. 4.95	
Galvanized (10 gage)	4.40	4.40	4.40		4.40			4.40	Canton =4.40	4.40	Ashland =4.40			5.15[15]	
Enameling (12 gage)	4.40	4.40	4.40	4.40			4.40		4.60	4.40		4.70			
Long ternes[2] (10 gage)	4.80		4.80							4.80					
STRIP Hot-rolled[3]	3.25 to 3.30	3.25 to 3.30	3.25	3.25 to 3.30	3.25	3.25	3.25	3.25		3.25	Warren =3.25	3.45		4.00 to 4.25	4.65
Cold-rolled[4]	4.00	4.25		4.00		4.00	4.00	4.00		New Haven 4.50 Warren =4.00 to 4.25		4.20 to 4.50			5.55
TINPLATE Cokes, 1.50 lb.[5] base box	$7.75	$7.75	$7.75		$7.85			$7.85	$7.95	Warren, Ohio =$7.75				Pittsburg, Cal. =$8.50	
Electrolytic 0.25, 0.50, 0.75 lb. box	Deduct $1.30, $1.05 and 75¢ respectively from 1.50 lb. coke base box price														
TERNES MFG., special coated	Deduct $1.10 from 1.50 lb. coke base box price														
BLACKPLATE CANMAKING 55 to 128 lb.	Deduct $2.00 from 1.50 lb. coke base box price														
BLACKPLATE, h.e., 29 ga.[10]	5.30	5.30	5.30					5.40		Warren, Ohio =5.30					
BARS Carbon Steel	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35		3.35	Canton =3.35	3.55	3.35	4.05 to 4.10	4.00
Reinforcing (billet)[7]	3.35	3.35	3.35	3.35	3.35	3.35	3.35	3.35			Canton =3.35		3.35	4.05 to 4.10	4.00
Cold-finished[8]	3.95 to 4.00	4.00	4.00	4.00		4.00	4.00					4.30			
Alloy, hot-rolled	3.75	3.75	3.75			3.75	3.75	Bethlehem, Canton, Massillon =3.75				4.05	3.75	4.80[14]	4.75
Alloy cold-drawn	4.65 to 4.75	4.65	4.65	4.65		4.65	4.65	Massillon =4.85			Worcester 4.95				
PLATE Carbon steel[11]	3.40 to 3.60	3.40	3.40	3.40 to 3.60	3.40	3.45	3.40	3.45 Coatesville =3.75, Claymont =3.95 Geneva =3.40, Harrisburg =6.50				3.65	3.45	4.30[16]	5.30
Floor plates	4.55	4.55		4.55	Cons	hohocken	=3.95	Cons hohocken =4.55							
Alloy	4.40	4.40							Coatesville =5.10						
SHAPES, Structural	3.25	3.25	3.25		3.25	3.30	Bethlehem =3.30, Geneva, Utah =3.25						3.30	3.85 to 4.30	3.80
MANUFACTURERS' WIRE[9] Bright	4.15	4.15		4.15	4.15		4.15	4.25	Duluth =4.15, Worcester =4.45				4.15	5.15[13]	
Spring (high carbon)	5.20	5.20		5.20				5.30	Worcester =5.50 New Haven, Trenton =5.50				5.20	Duluth =5.20-6.15	
PILING, Steel sheet	4.05	4.05				4.05									

STAINLESS STEELS

Base prices, in cents per pound, f.o.b. producing point

Product	Chromium Nickel						Straight Chromium		
	301	302	303	304	316	347	410	416	430
Ingots, rerolling	12.75	13.50	15.00	15.50	22.75	20.00	11.25	13.75	11.50
Slabs, billets, rerolling	17.00	18.25	20.25	19.25	30.25	26.75	15.00	18.50	15.25
Forging discs, die blocks, rings	30.50	30.50	33.00	32.00	49.00	41.00	24.50	25.00	25.00
Billets, forging	24.25–26.50	24.25–26.50	26.25–28.75	25.50–27.75	39.00–42.75	32.75–35.75	19.50–21.50	20.00–21.75	20.00–21.75
Bars, wire, structurals	28.50	28.50	31.00	30.00	46.00	38.50	23.00	23.50	23.50
Plates	32.00	32.00	34.00	34.00	50.50	44.00	26.00	26.50	26.50
Sheets	37.50–40.75	37.50–40.75	39.50–43.00	39.50–43.00	53.00–57.25	50.00–54.00	33.00	33.50	35.50
Strip, hot-rolled	24.25	25.75	30.00	27.75	46.00	38.75	21.25	28.00	21.75
Strip, cold-rolled	30.50–30.75	33.00–33.50	36.50–39.50	35.00–35.75	55.00–57.25	48.50–50.00	27.00	33.50	27.50

ELECTRODES

Cents per lb. f.o.b. plant, threaded electrodes with nipples, unboxed

Diameter in in.	Length in in.	
Graphite		
17, 18, 20	60, 72	16.00¢
8 to 16	48, 60, 72	16.50¢
7	48, 60	17.75¢
6	48, 60	19.00¢
4, 5	40	19.50¢
3	40	20.50¢
2½	24, 30	21.00¢
2	24, 30	23.00¢
Carbon		
40	100, 110	7.50¢
35	65, 110	7.50¢
30	65, 84, 110	7.50¢
24	72 to 104	7.50¢
17 to 20	84, 90	7.50¢
14	60, 72	8.00¢
10, 12	60	8.25¢
8	60	8.50¢

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	Base per lb
18	4	1	—	—	90.5¢
18	4	1	—	5	$1.42
18	4	2	—	—	$1.025
1.5	4	1.5	8	—	65¢
6	4	2	6	—	69.5¢

High-carbon-chromium ..... 52¢
Oil hardened manganese ..... 29¢
Special carbon ..... 26.5¢
Extra carbon ..... 22¢
Regular carbon ..... 19¢

Warehouse prices on and east of Mississippi are 2½¢ per lb higher. West of Mississippi, 4½¢ higher.

ELECTRICAL SHEETS

24 gage, HR cut lengths, f.o.b. mill

	Cents per lb
Armature	5.45 to 6.05
Electrical	5.95 to 6.55
Motor	6.70 to 6.95
Dynamo	7.50 to 7.75
Transformer 72	8.05 to 10.05
Transformer 65	8.60 to 10.60
Transformer 58	9.30 to 11.30
Transformer 52	10.10 to 11.35

RAILS, TRACK SUPPLIES

F.o.b. mill

Standard rails, 100 lb and heavier, No. 1 quality, per 100 lb ..... $3.20†
Joint bars, 100 lb 4.25
Light rails (from billets) per 100 lb 3.55

	Base Price cents per lb
Track spikes	5.35
Axles	5.20
Screw spikes	8.00
Tie plates	4.05
Tie plates, Pittsburgh, Calif.*	4.20
Track bolts, untreated	8.25
Track bolts, heat treated, to railroads	8.50

*Seattle, add 30¢.
†CF&I and Inland, $3.50.

C-R SPRING STEEL

Base per pound f.o.b. mill

0.26 to 0.40 carbon ..... 4.00¢
0.41 to 0.60 carbon ..... 5.50¢
0.61 to 0.80 carbon ..... 6.10¢
0.81 to 1.05 carbon ..... 8.05¢
1.06 to 1.35 carbon ..... 10.35¢
Worcester, add 0.30¢.

CLAD STEEL

Base prices, cents per pound

Stainless clad	Plate	Sheet
No. 304, 20 pct, f.o.b. Coatesville, Pa.	*26.50	
Washington, Pa.	*26.50	*22.50
Claymont, Del.	*26.50	
Conshohocken, Pa.		*22.50
Nickel-clad 10 pct f.o.b. Coatesville, Pa.	27.50	
Inconel-clad 10 pct, f.o.b. Coatesville.	36.00	
Monel-clad 10 pct, f.o.b. Coatesville.	29.00	
Aluminized steel sheets Hot dip, 20 gage, f.o.b. Butler, Pa.		9.25

*Includes annealing and pickling, or sandblasting.

MERCHANT WIRE PRODUCTS

To the dealer, f.o.b. mill

	Base Column	Pittsburg, Calif.
Standard & coated nails*	103	123
Galvanized nails*	103	123
Woven wire fence†	109	132
Fence posts, carloads††	114	...
Single loop bale ties	106	130
Galvanized barbed wire**	123	143
Twisted barbless wire	123	...

*Pgh., Chi., Duluth; Worcester, 6 columns higher. †15½ gage and heavier. **On 80 rod spools, in carloads. †† Duluth only.

	Base per 100 lb	Pittsburg, Calif.
Annealed fence wire‡	$4.80	$5.75
Annealed, galv. fencing‡	5.25	6.20
Cut nails, carloads‡‡	6.75	...

‡ Add 30¢ at Worcester; 10¢ at Sparrows Pt.
‡‡ Less 20¢ to jobbers.

HIGH STRENGTH, LOW ALLOY STEELS

Mill base prices, cents per pound

Steel	Aldecor	Corten	Double Strength No. 1	Dynalloy	HI Steel	Mayari R	Otiscoloy	Yoloy	NAX High Tensile
Producer	Republic	Carnegie-Illinois, Republic	Republic	Alan Wood	Inland	Bethlehem	Jones & Laughlin	Youngstown Sheet & Tube	Great Lakes Steel
Plates	5.20	5.20	5.20	5.30	5.20	5.30	5.20	5.40	5.65
Sheets									
Hot-rolled	4.95	4.95	4.95	5.25	4.95	4.95	4.95	5.15	5.25
Cold-rolled	6.05	6.05	6.05	.....	6.05	6.05	6.05	6.25	6.35
Galvanized	.....	6.75	.....	.....	.....	6.75	.....	.....	.....
Strip									
Hot-rolled	4.95	4.95	4.95	....	4.95	4.95	4.95	5.15	5.25
Cold-rolled	.....	.....	6.05	.....	.....	6.05	6.05	.....	6.35
Shapes	.....	4.95	.....	.....	4.95	5.05	4.95	.....	.....
Beams	.....	4.95	.....	.....	.....	.....	.....	.....	.....
Bars									
Hot-rolled	5.10	5.10	5.10	.....	5.10	5.10	5.10	.....	5.40
Bar shapes	.....	5.10	.....	.....	5.10	5.10	5.10	.....	.....

PIPE AND TUBING

Base discounts, f.o.b. mills, Base price, $200.00 per net ton.

STANDARD, THREADED AND COUPLED

	Black	Galv.
Steel, buttweld		
½-in.	43 to 41	21½ to 19½
¾-in.	46 to 44	25½ to 23½
1-in.	48½ to 46½	28½ to 26½
1¼-in.	49 to 47	29 to 27
1½-in.	49½ to 47½	29½ to 27½
2-in.	50 to 48	30 to 28
2½ to 3-in.	50½ to 48½	30½ to 28½
Steel, lapweld		
2-in.	39½	21 to 19
2½ to 3-in.	43½ to 42½	22 to 23
3½ to 6-in.	46½ to 42½	26 to 22
Steel, seamless		
2-in.	38½ to 27	18 to 6½
2½ to 3-in.	41½ to 32½	21 to 12
3½ to 6-in.	43½ to 38½	23 to 18
Wrought Iron, buttweld		
½-in.	+20½	+51
¾-in.	+10½	+40
1 & 1¼-in.	+ 4½	+31
2-in.	— 1½	+27½
3-in.	— 2	+27
Wrought Iron, lapweld		
2-in.	+ 7½	+35
2½ to 3½-in.	+ 5	+30½
4-in.	list	+24½
4½ to 8-in.	+ 2	+26

EXTRA STRONG, PLAIN ENDS

Steel, buttweld		
½-in.	42 to 40	22 to 20
¾-in.	46 to 44	26 to 24
1-in.	48 to 46	29 to 27
1¼-in.	48½ to 46½	29½ to 27½
1½-in.	49 to 47	30 to 28
2-in.	49½ to 47½	30½ to 29½
2½ to 3-in.	50 to 48	31 to 29
Steel, lapweld		
2-in.	39½ to 38½	20 to 19
2½ to 3-in.	44½ to 42½	25 to 23
3½ to 6-in.	48 to 44	28½ to 26½
Steel, seamless		
2-in.	37½ to 32½	18 to 13
2½ to 3-in.	41½ to 36½	22 to 18
3½ to 6-in.	45	25½
Wrought Iron, buttweld		
½-in.	+16	+45
¾-in.	+ 9½	+38
1 to 2-in.	— 1½	+27
Wrought Iron, lapweld		
2-in.	+ 4½	+31½
2½ to 4-in.	— 5	+20
4½ to 6-in.	— 1	+24½

For threads only, buttweld, lapweld and seamless pipe, one point higher discount (lower price) applies. For plain ends, buttweld, lapweld and seamless pipe 3-in. and smaller, three points higher discount (lower price) applies, while for lapweld and seamless 3½-in. and larger four points higher discount (lower price) applies. On buttweld and lapweld steel pipe, jobbers are granted a discount of 5 pct. On l.c.l. shipments, prices are determined by adding 25 pct and 30 pct and the carload freight rate to the base card.

BOILER TUBES

Seamless steel and electric welded commercial boiler tubes and locomotive tubes, minimum wall. Prices per 100 ft at mill in carload lots, cut length 4 to 24 ft inclusive.

OD Gage		Seamless		Electric Weld	
in.	BWG	H.R.	C.R.	H.R.	C.D.
2	13	19.18	22.56	18.60	21.89
2½	12	25.79	30.33	25.02	29.41
3	12	28.68	33.76	27.82	32.74
3½	11	35.85	42.20	34.78	40.94
4	10	44.51	52.35	43.17	50.78

CAST IRON WATER PIPE

Per net ton

6 to 24-in., del'd Chicago $106.70
6 to 24-in., del'd N. Y. ..... 103.50 to 108.40
6 to 24-in., Birmingham 93.50
6-in. and larger, f.o.b. cars, San Francisco, Los Angeles, for all rail shipment; rail and water shipment less 120.30

Class "A" and gas pipe, $5 extra; 4-in. pipe is $5 a ton above 6-in.

BOLTS, NUTS, RIVETS, SET SCREWS

Consumer Prices

(Bolts and nuts f.o.b. mill Pittsburgh, Cleveland, Birmingham or Chicago)

Base discount less case lots

Machine and Carriage Bolts

	Pct Off List
½ in. & smaller x 6 in. & shorter	35
9/16 & ⅝ in. x 6 in. & shorter	37
¾ in. & larger x 6 in. & shorter	34
All diam, longer than 6 in.	30
Lag, all diam over 6 in. longer	35
Lag, all diam x 6 in. & shorter	37
Plow bolts	47

Nuts, Cold Punched or Hot Pressed

(Hexagon or Square)

½ in. and smaller	35
9/16 to 1 in. inclusive	34
1⅛ to 1½ in. inclusive	32
1⅝ in. and larger	27

On above bolts and nuts, excepting plow bolts, additional allowance of 15 pct for full container quantities. There is an additional 5 pct allowance for carload shipments.

Semifinished Hexagon Nuts

	USS	SAE
7/16 in. and smaller	..	41
½ in. and smaller	38	..
½ in. through 1 in.	..	39
9/16 in. through 1 in.	37	..
1⅛ in. through 1½ in.	35	37
1⅝ in. and larger	28	..

In full case lots, 15 pct additional discount.

Stove Bolts

Packages, nuts separate	$61.75
In bulk	70.00

Large Rivets

(½ in. and larger)
Base per 100 lb

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$6.75
F.o.b. Lebanon, Pa.	6.75

Small Rivets

(7/16 in. and smaller)
Pct off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	48

Cap and Set Screws

(In packages) — *Pct Off List*

Hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in., SAE 1020, bright	46
¾ to 1 in. x 6 in., SAE (1035), heat treated	35
Milled studs	19
Flat head cap screws, listed sizes	5
Fillister head cap, listed sizes	28

FLUORSPAR

Washed gravel fluorspar, f.o.b. cars, Rosiclare, Ill.

Effective CaF, Content:	Base price per net ton
70% or more	$37.00
60% or less	34.00

LAKE SUPERIOR ORES

(51.50% *Fe, Natural Content, Delivered Lower Lake Ports*)

	Per Gross Ton
Old range, bessemer	$7.60
Old range, nonbessemer	7.45
Mesabi, bessemer	7.35
Mesabi, nonbessemer	7.20
High phosphorus	7.20

After Dec. 31, 1948, increases or decreases in Upper Lake freight, dock and handling charges and taxes thereon to be for the buyers' account.

METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.

Swedish sponge iron c.i.f. New York, ocean bags	7.9¢ to 9.0¢
Domestic sponge iron, 98+% Fe, carload lots	9.0¢ to 15.0¢
Electrolytic iron, annealed, 99.5+% Fe	31.5¢ to 39.5¢
Electrolytic iron, unannealed, minus 325 mesh, 99+% Fe	48.5¢
Hydrogen reduced iron, minus 300 mesh, 98+% Fe	63.0¢ to 80.0¢
Carbonyl iron, size 5 to 10 microns, 98%, 99.8%+ Fe	90.0¢ to $1.75
Aluminum	31.00¢
Antimony	51.17¢
Brass, 10 ton lots	27.25 to 37.25¢
Copper, electrolytic	23.625¢
Copper, reduced	34.25¢
Cadmium	$2.40
Chromium, electrolytic, 99% min.	$3.50
Lead	26.00¢
Manganese	60.00¢
Molybdenum, 99%	$2.65
Nickel, unannealed	67.00¢
Nickel, spherical, minus 30 mesh, unannealed	68.00¢
Silicon	34.00¢
Solder powder	8.5¢ plus metal cost
Stainless steel, 302	75.0¢
Tin	$1.165
Tungsten, 99%	$2.90
Zinc, 10 ton lots	17.00 to 20.75¢

COKE

	Net Ton
Furnace, beehive (f.o.b. oven) Connellsville, Pa.	$14.00 to $15.00
Foundry, beehive (f.o.b. oven) Connellsville, Pa.	$16.00 to $17.00
Foundry, Byproduct	
Buffalo, del'd	$22.95
Chicago, f.o.b.	20.40
Detroit, f.o.b.	19.40
New England, del'd	23.35
Seaboard, N. J., f.o.b.	21.50
Philadelphia, f.o.b.	21.05
Swedeland, Pa., f.o.b.	21.00
Painesville, Ohio, f.o.b.	20.90
Erie, del'd	$21.50 to 23.50
Cleveland, del'd	22.45
Cincinnati, del'd	21.50
St. Paul, f.o.b.	23.50
St. Louis, del'd	20.98
Birmingham, del'd	18.66

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

Carloads, Per 1000

First quality, Pa., Md., Ky., Mo., Ill. (except Salina, Pa., add $5)	$80.00
No. 1 Ohio	74.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	74.00
No. 2 Ohio	66.00
Ground fire clay, net ton, bulk (except Salina, Pa., add $1.50)	11.50

Silica Brick

Mt. Union, Pa., Ensley, Ala.	$80.00
Childs, Pa.	84.00
Hays, Pa.	85.00
Chicago District	89.00
Western, Utah and Calif.	95.00
Super Duty, Hays, Pa., Athens, Tex.	85.00
Silica cement, net ton, bulk, Eastern (except Hays, Pa.)	$13.75 to 14.00
Silica cement, net ton, bulk, Hays, Pa.	16.00
Silica cement, net ton, bulk, Ensley, Ala.	15.00
Silica cement, net ton, bulk, Chicago District	14.75
Silica cement, net ton, bulk, Utah and Calif.	21.00

Chrome Brick

Per Net Ton

Standard chemically bonded, Balt., Chester	$69.00

Magnesite Brick

Standard, Balt. and Chester	$91.00
Chemically bonded, Balt. and Chester	80.00

Grain Magnesite

Std. ⅜-in. grains

Domestic, f.o.b. Balt. and Chester, in bulk, fines removed	$56.50
Domestic, f.o.b. Chewelah, Wash., in bulk with fines	$30.50 to 31.00
in sacks with fines	35.00 to 35.50

Dead Burned Dolomite

F.o.b. producing points in Pennsylvania, West Virginia and Ohio, per net ton, bulk. Midwest, add 10¢; Missouri Valley, add 20¢ .. $12.25

WAREHOUSE PRICES

Base prices, f.o.b. warehouse, dollars per 100 lb. (Metropolitan area delivery, add 15¢ to base price except Cincinnati and New Orleans (•), add 10¢; New York, add 20¢.)

CITIES	SHEETS			STRIP		PLATES	SHAPES	BARS		ALLOY BARS			
	Hot-Rolled	Cold-Rolled (18 gage)	Galvanized (10 gage)	Hot-Rolled	Cold-Rolled		Standard Structural	Hot-Rolled	Cold-Finished	Hot-Rolled, A 4615 As-rolled	Hot-Rolled, A 4140-50 Ann.	Cold-Drawn, A 4615 As-rolled	Cold-Drawn, A 4140-50 Ann.
Baltimore	5.31	6.21-6.41	6.95-7.11	5.37	....	5.56	5.38	5.42	6.16	....	10.10	....	....
Birmingham	5.05	....	6.45	5.05	6.68	5.25	5.00	5.00	6.68	....	....	....	....
Boston	5.55	6.45-6.75	7.71-7.85	5.65-5.95	6.75	5.80	5.42	5.52	6.27	9.64-9.82	10.04-10.07	11.23-11.27	11.47-11.52
Buffalo	4.85	5.00-5.75	7.26-7.70	5.29-5.65	6.35-7.27	5.35	5.10	5.05-5.15	5.90	9.70-9.73	9.95-9.98	11.15-11.18	11.40-11.43
Chicago	4.85	5.75	7.10	4.85	6.68	5.10	.90	4.90	5.70	9.35-9.50	9.60-9.75	10.80-10.90	11.05-11.15
Cincinnati	5.16-5.28•	6.13•-6.18	7.53	5.28•-5.55	....	5.53•-5.63	5.40•-5.48	5.33•-5.55	6.09•-6.10	9.74	9.99	11.19	11.44
Cleveland	4.98-5.16	5.75-6.06	7.20-7.46	5.03-5.15	....	5.37-5.54	5.16-5.47	5.17-5.34	5.90-5.97	9.49-9.66	9.74-9.91	10.95-11.07	11.19-11.32
Detroit	5.28-5.32	6.07-6.18	7.53-7.58	5.28-5.47	6.27-6.56	5.53-5.57	5.40	5.33-5.55	6.01-6.10	9.69-9.82	9.94-10.07	11.11-11.14	11.35-11.39
Houston	6.50-6.70	....	8.50	7.00	....	6.70	6.55	6.65	7.60	10.30	10.25	11.45	11.70
Indianapolis	5.15	6.05	7.39	5.15	6.25	5.40	5.20	5.35	6.50	....	....	....	....
Los Angeles	6.45-6.60	7.90-8.05	8.75-8.90	6.65-6.80	9.35[5]	6.15	5.95-6.10	6.10-6.25	7.95[14]-9.35	10.90-11.60	10.85-11.55	12.40-12.95	12.65-13.20
Memphis	5.75	6.60	....	5.95	6.80	5.95	5.75	5.75	6.50	....	....	....	....
Milwaukee	5.03	5.93	7.28	5.38	6.86	5.28	5.08	5.08	5.87-5.88	9.53	9.78	10.98	11.23
New Orleans	5.95•	6.75•	....	6.15•	....	6.15•	5.95•	5.95•	6.65•	....	....	....	....
New York	5.40-5.51	6.46	7.71-7.86	5.62-5.98	....	5.70-6.00	5.33-5.61	5.57-5.80	6.41-6.61	9.73-9.93	9.98-10.18	11.18-11.38	11.43-11.63
Norfolk	5.80	....	....	6.05	....	6.05	6.05	6.05	7.05	....	....	....	....
Omaha	5.92	....	9.18	5.92	....	6.17	5.97	5.97	6.77	....	....	....	....
Philadelphia	5.15-5.44	6.36-6.79	7.33-7.43	5.35-5.45	6.74	5.38	5.10	5.40-5.45	6.19	9.50	9.75-10.34	10.95	11 20
Pittsburgh	4.85	5.75[1]	7.15	5.00	6.00	5.05	4.90	4.90	5.65	9.35	9.60	10.80	11.05-11.30
Portland	6.50[8]-6.60	8.00[1]	8.80-9.20	6.85[8]	....	6.30[8]	6.35[8]	6.35[8]	8.25[14]	10.50[6]	10.10[6]	....	....
Salt Lake City	7.05-9.00	8.20	7.90-9.06	7.10-7.70	....	5.75-6.85	6.65-7.00	6.95-7.25	7.40-7.55	....	....	....	....
San Francisco	6.15[8]	7.50[2]	8.10[2]	6.75[8]	8.25[5]	6.35[8]	5.90[8]	5.90[8]	7.55	10.90[15]	10.85[15]	12.40[15]	12.85[15]
Seattle	6.20[4]-7.10[4]	7.75[2]-8.65[2]	7.65-9.15[2]	6.55[4]-6.70[4]	....	6.20-6.35[4]	6.15-6.30[4]	6.05[4]-6.20[4]	8.00[14]-8.15[14]	....	10.30[15]-11.35[15]	....	12.00[15]-14.10[15]
St. Louis	5.21-5.37	6.12-6.27	7.47-7.52	5.22-5.97	8.68	5.47-5.62	5.27-5.42	5.27-5.92	6.07-6.22	9.72	9.97	....	11.42
St. Paul	5.44	6.19-6.34	7.74	5.44	6.82	5.64-6.89	5.49	5.49	6.29	....	....	....	....

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT-ROLLED:
Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD-ROLLED:
Sheets, 400 to 1999 lb; strip, extras on all quantities bars 1000 lb and over.

ALLOY BARS:
1000 to 1999 lb.

GALVANIZED SHEETS:
450 to 1499 lb.

EXCEPTIONS:
(1) 400 to 1499 lb; (2) 450 to 1499 lb; (3) 300 to 4999 lb; (4) 300 to 9999 lb; (5) 2000 lb and over; (6) 1000 lb and over; (7) 400 to 14,999 lb; (8) 400 lb and over; (9) 500 to 1999 lb; (10) 500 to 999 lb; (11) 400 to 3999 lb; (12) 450 to 3749 lb; (13) 400 to 1999 lb; (14) 1500 lb and over; (15) 1000 to 4999 lb; (16) 4000 lb and over; (17) up to 1999 lb; (18) 1000 to 1499 lb.

PIG IRON PRICES

Dollars per gross ton. Delivered prices represent minimums. Delivered prices do not include 3 pct tax on freight nor the 6 pct increase on total freight charges in the Eastern Zone (5 pct Southern Zone, 4 pct Western Zone), effective Jan. 11, 1949.

PRODUCING POINT PRICES

Producing Point	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Bethlehem	48.00	.....	.....	.....	.....
Birmingham	42.88	43.38	.....	.....	.....
Buffalo	47.00	47.00	47.50	.....	.....
Chicago	46.00	46.50	46.50	47.00	.....
Cleveland	46.00	46.50	46.50	47.00	51.00
Duluth	46.00	46.50	46.50	47.00	.....
Erie	46.00	46.50	46.50	47.00	.....
Everett	.....	52.75	53.25	.....	.....
Granite City	47.90	48.40	48.90	.....	.....
Ironton, Utah	46.00-47.00	46.50-47.50	.....	.....	.....
Lone Star, Texas	45.00	46.50†	.....	.....	.....
Neville Island	46.00	46.50	46.50	.....	.....
Geneva, Utah	46.00	46.50	.....	.....	.....
Sharpsville	46.00	46.50	46.50	47.00	.....
Steelton	46.00	46.50	49.00	49.50	54.00
Struthers, Ohio	46.00	.....	.....	.....	.....
Swedeland	50.00	50.50	51.00	51.50	.....
Toledo	46.00	46.50	46.50	47.00	.....
Troy, N. Y.	.....	.....	.....	.....	54.00
Youngstown	46.00	46.50	46.50	.....	.....

DELIVERED PRICES (BASE GRADES)

Consuming Point	Producing Point	Freight Rate	Basic	No. 2 Foundry	Malleable	Bessemer	Low Phos.
Boston	Everett	$0.50 Arb.	.....	52.75	53.25	.....	.....
Boston	Steelton	6.27	54.27	54.77	55.27	55.77	60.27
Brooklyn	Bethlehem	3.90	51.90	.....	.....	.....	.....
Cincinnati	Birmingham	6.09	48.97	49.46	.....	.....	.....
Jersey City	Bethlehem	2.39	50.39	.....	.....	.....	.....
Los Angeles	Geneva-Ironton	6.93	52.93-53.93	53.43-54.43	.....	.....	.....
Mansfield	Cleveland-Toledo	3.03	49.03	49.53	49.53	50.03	54.03
Philadelphia	Bethlehem	2.21	50.21	.....	.....	.....	.....
Philadelphia	Swedeland	1.31	51.31	51.81	52.31	52.81	.....
Philadelphia	Steelton	2.81	50.81	51.31	51.81	52.31	56.81
San Francisco	Geneva-Ironton	6.93	52.93-53.93	53.43-54.43	.....	.....	.....
Seattle	Geneva-Ironton	6.93	52.93-53.93	53.43-54.43	.....	.....	.....
St. Louis	Granite City	0.75 Arb.	48.65	49.15	49.65	.....	.....
Gulf Ports	Lone Star, Texas	.....	50.50	51.00†			

† Low Phos, Southern Grade

Producing point prices are subject to switching charges; silicon differential (not to exceed 50¢ per ton for each 0.25 pct silicon content in excess of base grade which is 1.75 to 2.25 pct for foundry iron); phosphorus differentials, a reduction of 38¢ per ton for phosphorus content of 0.70 pct and over manganese differentials, a charge not to exceed 50¢ per ton for each 0.50 pct manganese content in excess of 1.00 pct. $2 per ton extra may be charged for 0.5 to 0.75 pct nickel content and $1 per ton extra for each additional 0.25 pct nickel.

Silvery iron (blast furnace) silicon 6.00 to 6.50 pct. C/L per g.t., f.o.b. Jackson, Ohio —$59.50; f.o.b. Buffalo, $60.75. Add $125 per ton for each additional 0.50 pct Si up to 12 pct. Add 50¢ per ton for each 0.50 pct Mn over 1.00 pct. Add $1.00 per ton for 0.75 pct or more P. Bessemer ferrosilicon prices are $1.00 per ton above silvery iron prices of comparable analysis.

Charcoal pig iron base price for low phosphorus $66.00 per gross ton, f.o.b. Lyles, Tenn. Delivered Chicago, $73.78. High phosphorus charcoal pig iron is not being produced.

Ferromanganese

78-82% Mn, Maximum contract base price, gross ton, lump size.

F.o.b. Birmingham $174
F.o.b. Niagara Falls, Alloy, W. Va., Welland, Ont. $172
F.o.b. Johnstown, Pa. $174
F.o.b. Sheridan, Pa. $172
F.o.b. Etna, Pa. $175

$2.00 for each 1% above 82% Mn; penalty, $2.00 for each 1% below 78%.

Briquets—Cents per pound of briquet, delivered, 66% contained Mn.

Carload, bulk 10.45
Ton lots 12.05
Less ton lots 12.95

Spiegeleisen

Contract prices gross ton, lump, f.o.b.

	16-19% Mn 3% max. Si	19-21% Mn 3% max. Si
Palmerton, Pa.	$64.00	$65.00
Pgh. or Chicago	65.00	66.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.

96% min. Mn, 0.2% max. C, 1% max. Si, 2% max. Fe.

Carload, packed 35.5
Ton lots 37.0

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, cents per pound.

Carloads 28
Ton lots 30
Less ton lots 32

Low-Carbon Ferromanganese

Contract price, cents per pound Mn contained, lump size, delivered.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	25.25	27.10	28.30
0.10% max. C	24.75	26.60	27.80
0.15% max. C	24.25	26.10	27.30
0.30% max. C	23.75	25.60	26.80
0.50% max. C	23.25	25.10	26.30
0.75% max. C, 7.00% max. Ci	20.25	22.10	23.30

Silicomanganese

Contract basis, lump size, cents per pound of metal, delivered, 65-68% Mn, 18-20% Si, 1.5% max. C. For 2% max. C, deduct 0.2¢.

Carload bulk 8.95
Ton lots 10.60
Briquet, contract basis, carlots, bulk delivered, per lb of briquet 10.30
Ton lots 11.90
Less ton lots 12.80

Silvery Iron (electric furnace)

Si 14.01 to 14.50 pct, f.o.b. Keokuk, Iowa, openhearth $84.00, foundry, $85.00; $84.75 f.o.b. Niagara Falls; Electric furnace silvery iron is not being produced at Jackson. Add $1.00 per ton for each additional 0.50% Si up to and including 18%. Add $1.00 for each 0.50 pct. Mn over 1 pct.

Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, for ton lots packed.

96% Si, 2% Fe 20.70
97% Si, 1% Fe 21.10

Silicon Briquets

Contract price, cents per pound of briquet, bulk, delivered, 40% Si, 1 lb Si briquets.

Carload, bulk 6.30
Ton lots 7.90
Less ton lots 8.80

Electric Ferrosilicon

Contract price, cents per pound contained Si, lump size, bulk, in carloads, delivered.

25% Si 18.50
50% Si 11.30
75% Si 13.50
85% Si 14.65
90-95% Si 16.50

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
Less ton lots	2.40	3.30	4.55

Ferrochrome

Contract prices, cents per pound, contained Cr, lump size, bulk, in carloads, delivered. (65-72% Cr, 2% max. Si)

0.06% C 28.75
0.10% C 28.25
0.15% C 28.00
0.20% C 27.75
0.50% C 27.50
1.00% C 27.25
2.00% C 27.00
65-69% Cr, 4-9% C 20.50
62-66% Cr, 4-6% C, 6-9% Si 21.35

Briquets—Contract price, cents per pound of briquet, delivered, 60% chromium.

Carload, bulk 13.75
Ton lots 15.25
Less ton lots 16.15

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome price schedule. Add 5¢ for each additional 0.25% N.

S. M. Ferrochrome

Contract price, cents per pound chromium contained, lump size, delivered.

High carbon type: 60.65% Cr, 4-6% Si, 4-6% Mn, 4-6% C.

Carloads 21.60
Ton lots 23.75
Less ton lots 25.25

Low carbon type: 62-66% Cr, 4-6% Si, 4-6% Mn, 1.25% max. C.

Carloads 27.75
Ton lots 30.05
Less ton lots 31.85

Chromium Metal

Contract prices, cents per lb chromium contained packed, delivered, ton lots. 97% min. Cr, 1% max. Fe.

0.20% max. C 1.09
0.50% max. C 1.05
9.00% min. C 1.04

Calcium—Silicon

Contract price per lb of alloy, lump, delivered.

30-33% Ca, 60.65% Si, 3.00% max. Fe.

Carloads 17.90
Ton lots 21.00
Less ton lots 22.50

Calcium—Manganese—Silicon

Contract prices, cents per lb of alloy, lump, delivered.

16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads 19.25
Ton lots 21.55
Less ton lots 22.55

CMSZ

Contract price, cents per pound of alloy, delivered.

Alloy 4: 45-49% Cr, 4-6% Mn, 18-21% Si, 1.25-1.75% Zr, 3.00-4.5% C.

Alloy 5: 50-56% Cr, 4-6% Mn, 13.50-16.00% Si, 0.75 to 1.25%Zr, 3.50-5.00% C.

Ton lots 19.75
Less ton lots 21.00

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. V-5: 38-42% Cr, 17-19% Si, 8-11% Mn.

Ton lots ..... 15.75¢
Less ton lots ..... 17.00¢

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Ton lots and carload packed ..... 18.00¢
Less ton lots ..... 19.50¢

SMZ

Contract price, cents per pound of alloy, delivered. 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe, ½ in. x 12 mesh.

Ton lots 17.25
Less ton lots 18.50

Other Ferroalloys

Ferrotungsten, standard, lump or ¼ x down, packed, per pound contained W, 5 ton lots, delivered $2.25

Ferrovanadium, 35-55%, contract basis, delivered, per pound, contained, V.

Openhearth $2.90
Crucible 3.00
High speed steel (Primos) ... 3.10

Vanadium pentoxide, 88-92% V_2O_5 contract basis, per pound contained V_2O_5 ..... $1.20

Ferrocolumbium, 50-60% contract basis, delivered, per pound contained Cb.

Ton lots $2.90
Less ton lots 2.95

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Pa., per pound contained Mo. $1.10

Calcium molybdate, 45-50%, f.o.b. Langeloth, Pa., per pound contained Mo. ..... 96¢

Molybdenum oxide briquets, f.o.b. Langeloth, Pa., per pound contained Mo. ..... 95¢

Ferrotitanium, 40%, regular grade, 10% C max., f.o.b. Niagara Falls, N. Y., freight allowed east of Mississippi and north of Baltimore, ton lots, per lb contained Ti $1.28

Ferrotitanium, 25%, low carbon, f.o.b. Niagara Falls, N. Y., freight allowed east of Mississippi and north of Baltimore, ton lots, per lb contained Ti $1.40
Less ton lots 1.45

Ferrotitanium, 15 to 19%, high carbon, f.o.b. Niagara Falls, N. Y., freight allowed east of Mississippi and north of Baltimore, carloads, per net ton $160.00

Ferrophosphorus, electrolytic, 23-26%, carlots, f.o.b. Siglo, Mt. Pleasant, Tenn., $3 unitage, per gross ton $65.00
10 tons to less carload 75.00

Zirconium, 35-40%, contract basis, f.o.b. plant, freight allowed, per pound of alloy.

Ton lots ..... 21.00¢

Zirconium, 12-15%, contract basis, lump, delivered, per pound of alloy.

Carload, bulk ..... 6.60¢

Alsifer, 20% Al, 40% Si, 40% Fe, contract basis, f.o.b. Suspension Bridge, N. Y.

Carload ..... 8.90¢
Ton lots ..... 9.80¢

Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per pound

Carload, bulk ..... 11.00¢
Ton lots, packed ..... 11.25¢
Less ton lots ..... 11.75¢

Boron Agents

Contract prices per pound of alloy, delivered.

Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D.

Ton lot $1.30

Manganese—Boron 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, delivered.

Ton lots $1.67
Less ton lots 1.79

Nickel—Boron 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, delivered.

Less ton lots $1.80

Silcaz, contract basis, delivered.

Ton lots ..... 45.00¢

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 100 lb and over.

No. 1 ..... 93¢
No. 6 ..... 63¢
No. 79 ..... 45¢

Bortam, f.o.b. Niagara Falls

Ton lots, per pound ..... 45¢
Less ton lots, per pound ..... 50¢

Carbortam, f.o.b. Suspension Bridge, N. Y.: freight allowed, Ti 15-18%, B 1.00-1.50%, Si 2.5-3.0%, Al 1.0-2.0%.

Ton lots, per pound ..... 8.625¢

Borosil, f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B $6.25

Pig Iron Market

(CONTINUED FROM PAGE 125)

have been studying the eastern market and some have returned to offer iron to old customers, but there is no real surplus tonnage of iron yet available to the eastern market which might result in active price competition. Consumers are certain that the present steel scrap price level leaves an ample margin to encourage a reduction in the use of hot metal by steel producers, thereby throwing more pig iron on the market.

The eastern market has been largely cut off from southern iron since the beginning of the war, except for the receipts of an eastern pipe producer from its subsidiary company. If this tonnage could be obtained on the northern market, there is no doubt that the Birmingham tonnage would be left to meet the growing needs of the industrialized south.

Freight rates, higher than ever before, have served to circumscribe the market areas of producers. There is no longer any assurance that furnaces will be able to sell competitively at a considerable distance away, particularly in view of the f.o.b. furnace method of pricing. Pig iron prices are still high enough, however, to have permitted some high cost producers to reduce their prices enough to retain a share of the market. After competition sets in, it will be another story, although freight rates will protect one New England high cost furnace to some extent.

Producers have already begun to canvass the prospects for lower water rates. Birmingham iron can be brought by rail to Norfolk, Va., and by barge through the Chesapeake and Delaware as in prewar years. Buffalo iron can come by barge to Jersey City, and westward by rail or by ocean-going vessel up the Delaware at least as far as Burlington, N. J. But the savings by water shipment are not expected to be great, as these rates have kept pace with freight increases.

Pig iron price reductions have been made so far only by the high priced furnaces who have recognized that consumers no longer have to pay a premium to get iron. These reductions have only been sufficient to permit them to compete with a lower priced producer in certain areas, particularly where they have a freight advantage.

At present prices, Buffalo producers can compete throughout New England almost up to Boston where the Mystic furnace controls the market. The present freight rate differential to Pittsfield, Mass., from Buffalo and Everett, Mass., is $3.45, less than the current price difference of $5.75 for foundry iron. Buffalo producers cannot compete in the Philadelphia market at current prices as the rail freight rate is $9.18.

When the steel market falls to the extent that ingot rates are lowered, there is no doubt that pig iron prices will be reduced. And the aftermath of the struggle to maintain markets may bring some measure of freight absorption back into the pig iron market. Current low cast scrap prices may make lower prices necessary at an early date in order to move iron.

James M. Darbaker To Head Carnegie's Sales

Pittsburgh

• • • **James M. Darbaker** has been appointed general manager of sales Carnegie-Illinois Steel Corp., Pittsburgh. Mr. Darbaker, since 1947, has been Chicago manager of operations. S. M. Jenks, former general superintendent of Gary works, has been named to succeed Mr. Darbaker as manager of operations. Both appointments were effective April 1. Mr. Darbaker is taking over the position left vacant last June when J. Douglas Darby became vice-president in charge of sales for Carnegie-Illinois. John Vohr, formerly assistant general superintendent of the South Works, Carnegie-Illinois Steel Corp., has moved over to Gary, and assumes Mr. Jenks' former job there.

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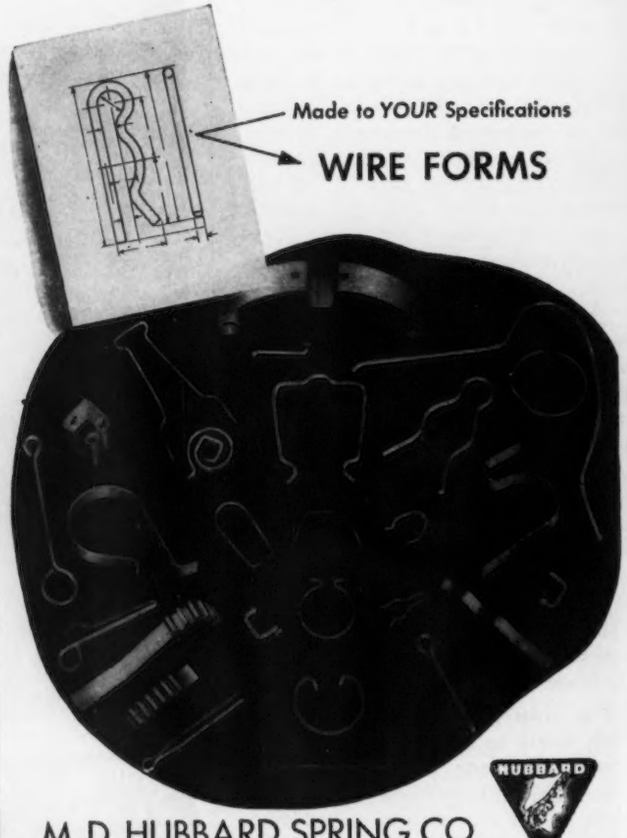

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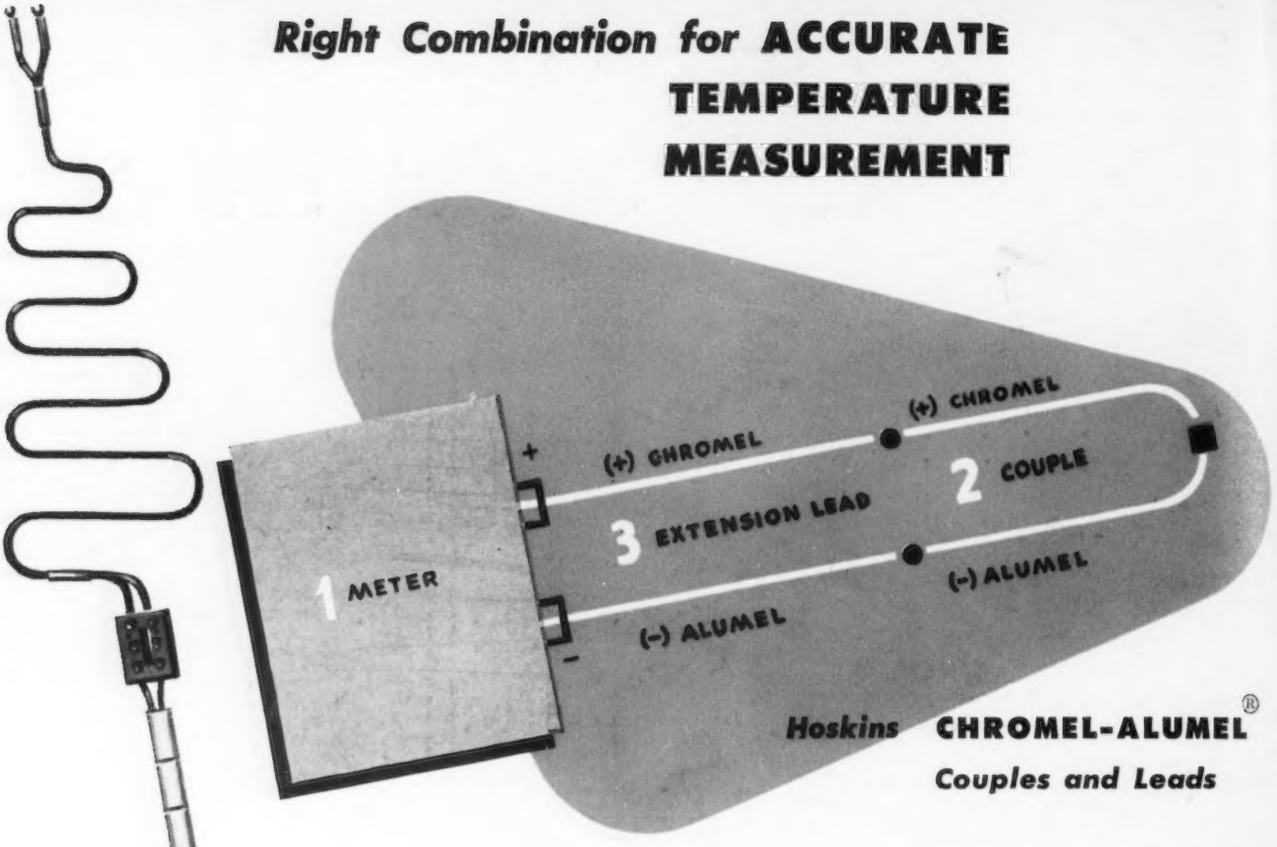

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